Class SB397

Book .S74

TREATISE
ON THE
CULTURE OF THE VINE;
WITH
New Hints
ON THE
FORMATION OF VINEYARDS
IN ENGLAND.

A
TREATISE
ON THE
CULTURE OF THE PINE APPLE,
AND THE
Management
OF
THE HOT-HOUSE.

BY WILLIAM SPEECHLY.

THE THIRD EDITION.

LONDON:
PRINTED FOR LONGMAN, HURST, REES, ORME, AND BROWN,
PATERNOSTER-ROW.

1821.

SB399
S74

H. E. P. Nov. 4, 11.

A

TREATISE

ON THE

CULTURE OF THE VINE,

EXHIBITING NEW AND ADVANTAGEOUS
METHODS OF

PROPAGATING, CULTIVATING, AND TRAINING

THAT PLANT,

SO AS TO RENDER IT ABUNDANTLY FRUITFUL:

TOGETHER WITH

NEW HINTS

ON THE

FORMATION OF VINEYARDS

IN ENGLAND.

THIRD EDITION, WITH ADDITIONS.

PREFACE.

THERE never was a period when the science of gardening was so universally and so ardently cultivatèd as it is at present ; and of the extensive field of Horticulture, no part affords more agreeable amusement, or yields more solid satisfaction and advantage, than that refined and elegant branch of it, which concerns the forcing of fruits, natives of warmer climes; and amongst these, though the variety of them be so great, the Vine stands foremost, and the most conspicuous.

Of all the numerous sorts of fruits indulgent nature produces for the use of man, that of the grape must be esteemed her noblest gift ; for although various others not only afford comforts, but many of them even contribute to the luxury of the human race, yet none of them tend so eminently as does this fruit, to exhilarate the spirits and glad the heart of man.

In the most early ages the vine became an object of attention and improvement ; for we find it the first cultivated plant on record in Holy Writ,

Gen. ix. 20. And if we duly consider the vast importance of its fruit in every shape and view, it may justly be esteemed the best and most useful fruit-tree in the world. The ripe fruit serves to constitute a rich and wholesome repast; and, when dried, forms a most material and lucrative article of commerce to the inhabitants of many parts of the globe; but the most important and most transcendant article, wine, may justly be esteemed as one of our choicest blessings, so the most valuable gift of nature.

From the situation of this island, and from the nature of the Vine, it may seem doubtful whether wine can be made in this country to any considerable national advantage: but still we find, by experience, that by artificial means, even the latest kinds of grapes may be brought to almost as high a degree of perfection as they are in their own native soils and climes. The principal objects of expence required for this end are *fuel* and *glass*; the former article is of small consideration in counties where coals abound, but glass is become a truly serious affair; and indeed it were much to be wished, that glass employed in gardens should be exempt from duty; for please to consider, by the aid of this useful material in gardening, our markets would be more plentifully supplied with many kinds of fruit, and also with rare and wholesome vegetables, at a much earlier season than in

the natural way they can possibly be ; and these, let me observe, are not to be considered as articles of luxury.

But in regard to the variety of plants generally cultivated in stoves, &c. I may properly add, that, independently of profit, every denomination of Forcing-houses is capable of affording to a speculative mind a source of rational pleasure and real satisfaction.

An attention to the progress of vegetable life administers to the mind something more solid than mere amusement. The budding, leafing, and flowering of plants, together with the progress of the various fruits from their first infantile appearance, to the final period of their perfection, all unfold a scene of admiration and amazement, of gratitude, and thankfulness.*

* “ There is a particular pleasure to see things in their origin, and by what degrees and successive changes they rise into that order and state we see them in afterwards, when completed. I am sure, if ever we would view the paths of Divine Wisdom, in the works and in the conduct of nature, we must not only consider how things are, but how they came to be so.

“ It is pleasant to look upon a tree in the summer, covered with its green leaves, decked with blossoms, or laden with fruit, and casting a pleasing shade under its spreading boughs ; but to consider how this tree, with all its furniture, sprang from a little seed, how nature shaped it, and fed it in its infancy and growth ; added new parts, and still advanced it by little and little, till it came to this greatness and perfection. This, methinks, is another sort of pleasure, more rational, less common,

The humble Hyssop on the wall, as well as the lofty Cedar, shows plainly that an Almighty and an All-wise hand has formed it. Nature's works are all complete; and the more minutely we observe, investigate, and consider them, the more we must admire the wisdom, and adore the goodness of the munificent and august Creator. *

and which is properly the contemplation of Divine Wisdom in the works of nature."

Dr. Burnet's Theory of the Earth, vol. i. book i. chap. v.

* Dr. R. Watson, in his *Chemical Essays*, vol. i. p. 86. has thus judiciously observed the surprising and beautiful regularity of nature.

"There are a great many circumstances relative to the manner in which different salts crystallise, which cannot be insisted on in this place; one thing deserves particularly to be remarked, that every salt in crystallising, invariably assumes its own peculiar form. You may dissolve common salt, or saltpetre, a thousand times, and crystallize them as often by evaporating or cooling the water in which they are dissolved, yet will you still find the common salt will be constantly crystallised in the form of a cube, and the saltpetre in the form of a prism; and if you examine with a microscope such saline particles as are not visible to the naked eye, you will observe these particles to be of the same shape with the larger masses. The definite figure appropriate to every particular species of salt, may admit a little variety from the accidental admixture of other bodies, or from some singular circumstances attending the evaporation and crystallisation of the solution; but these varieties are foreign to the nature of the salt, and are not greater than what attend almost every species of vegetables, and even of animals, from change of food and climate.

"Here a large field of enquiry opens to our view; and though it be better, as Seneca has it, *de re ipsa quærerere quàm mirari*;

To come now to the ensuing work. The first object of consideration is the Pine and Grape stove; and it must be admitted, that the original and principal object of an Hot-house consists in the culture of the Ananas or Pine-Apple; but still, if the Pinery be properly constructed, Vines may, at the same time, be propagated therein to great advantage.

I know there are many persons who dissent from this mode of practice, and they found their opinions on the following objections:

First, They suppose that Pine-stoves are improper for Vines, because the Pine being a tropical plant, it naturally requires a greater degree of heat than the Vine can possibly bear.

Secondly, Because it is usual to train the Vines along the under sides of the rafters which support the glass-frames, they suppose that their leaves, by contributing to darken the stove, must, consequently, tend greatly to injure the crop of Pines.

Thirdly, They allege, and this is but too pre-

yet all our attempts to investigate the works of God are weak and ineffectual; we feel his interference every where, but we cannot apprehend the nature of his agency any where. A blade of grass cannot spring up, a drop of rain cannot fall, a ray of light cannot be emitted from the sun, nor a particle of salt be united, with a never-failing symmetry, to its fellow, without him: every secondary cause we discover, is but a new proof of the necessity we are under of ultimately recurring to him, as the primary cause of every thing."

valent an opinion, that grapes produced in Pine-stoves are seldom so well flavoured as grapes from a Vinery.

To the first of these objections I here reply, by asserting, that the Vine will bear the degree of heat proper for Pines, and that this is proved by daily experience. There is a Vine now (1789) growing in the Pinery at Welbeck, which has constantly produced good crops of grapes for more than twenty years past. Its roots are entirely within the house, and make annual progress in the Pine-pits, among the leaves of trees, which are used here instead of tan; and please to consider, that in this mode of proceeding, the situations of the Pine and Vine are extremely different.

The Pine is situated in the lower part of the house, but the shoots of the Vine are trained immediately under the roof, and, consequently, are greatly affected by the external air, especially when such air is admitted into the house. Besides, let me add, that the Pines, being plunged in the tan-bed, receive a constant warmth from thence, and their roots are nourished by its genial heat. But the whole system of the fibres in the roots of the Vines being in the open ground on the outside of the house, they are at all times exposed to the weather, which must necessarily have a wonderful effect upon the whole plant at all seasons of the year.

That the second objection is of force, where the Vines in a Hot-house are under an injudicious management, must be admitted; but when their shoots are trained with propriety, and according to the method herein prescribed, the Pines will rather be benefited than injured, by the kindly shade the Vine leaves will afford. For please to consider that the Vine is a deciduous plant, and therefore its branches are destitute of leaves at the season when the Pine most requires sun.

And as to the last objection, grapes, well perfected in Hot-houses, are generally very rich; but it must be confessed that their skins are very often impregnated with a disagreeable flavour. But I shall venture to affirm, that the cause of this defect most generally proceeds, either from the languishing state of the Vine, the effect of insects, or else from fumigations, or some similar practice, made use of to destroy the various insects that infest Hot-houses; and, therefore, I insist, first, that a plentiful admission of free air in summer is as necessary for the Pine as the Vine. See section on Air, &c. in my Treatise on the Culture of the Pine, &c.

And, secondly, that when air is properly and plentifully admitted into the Hot-house, and every other part of the management is conducted with propriety, grapes produced in Pine-stoves com-

monly prove well flavoured, and in a high state of perfection.

The advantages to be gained by the new methods of propagating the Vine by seed, and by engrafting, appear very conspicuous in theory; and I have now the pleasure of informing my readers, that the event upon trial and practice has proved quite flattering and equally satisfactory.

My best endeavours, moreover, have not been wanting in obtaining new varieties of grapes from abroad; and I trust that many of the species here enumerated will be considered as a real and valuable acquisition to this country.

It is possible that the mode of practice herein set forth may, in certain respects, be deemed by some as superfluous. They may allege that good grapes may be gotten by methods less expensive. But let me tell them, that in order to obtain grapes in a supreme degree of perfection, in a country so situated as ours is, one ought to employ every expedient that may seem calculated to tend to advantage, and ensure success.

And in respect of erecting buildings, either Vineries, or Pine and Grape stoves, whatever may be the design intended, I most strongly advise, that such erections should be well and substantially executed.

I did not originally intend to give an account of Vineyards in the following work, but considering

that a treatise on the culture of the Vine would appear deficient without it, I resolved to add the fourth book, expressly for the purpose of illustrating that subject; and I am willing to hope, that on account of the original hints there given, it will not be deemed the least useful and important part of this treatise.

The Duke of Portland, after all his other indulgences, was pleased to give me free access to His Grace's noble library at this place, which has enabled me to add many important observations in the *notes*, which cannot fail of being acceptable to the *reader*. The names of the authors consulted will appear in the respective notes.

Welbeck, May 1. 1789.

OF THE
CULTURE
OF THE
VINE, OR GRAPE-TREE.

BOOK I.

THERE are several species of the Vine, but I shall take notice of the principal sort, (*Vitis Vinifera*) which is so highly and justly esteemed for its most excellent and valuable fruit.^a Of this

^a VITIS, VINE.

GENERIC CHARACTER.

CALYX. *Perianthium* five-toothed, small.

COROLLA. *Petals* five, simple, small, soon falling off.

STAMINA. *Filaments* five, awl-shaped, and somewhat spreading, falling off; *Antheræ* simple.

PISTILLUM. *Germen* egg-shaped; *Style* none; *Stigma* blunt-headed.

PERICARPIUM. *Berry* roundish, large, of one cell.

SEMINA. *Seeds* five, boney, heart and somewhat top shaped; contracted at the edge, nearly two-cell ed.

there are a numerous variety, which are exceedingly different in many particulars, but especially in the shape, colour, and flavour of the grapes.

As new kinds of grapes are constantly raised from seed, the Vine admits of an almost infinite variety, which are all supposed to be the progeny of one mother species.

I have, for a long series of years, exerted my utmost endeavours in obtaining different varieties of grapes from various parts of the globe; and I flatter myself, that many of the sorts will be deemed real acquisitions to this country. I shall not, however, enumerate all the varieties that compose the list of grapes now growing at Welbeck, (which consists of above 100 sorts,) as some of them have not yet borne fruit, and many others are esteemed only on account of being proper for making wine; some of the sorts, moreover, are so much alike,

ESSENTIAL CHARACTER.

Petals cohering at the base, withering. *Berry* five-seeded.

SPECIFIC CHARACTER.

VITIS *Vinifera*. VINE *wine-yielding*.

V. *Leaves* lobed, sinuous, naked. *Tendrils* opposite to the leaves, bearing the fruit and flowers in clusters.

A native of the temperate climates in the four parts of the world.

The Vine, according to the Sexual System of Botany, belongs to the class and order *Pentandria Monogynia*, the flowers having five stamina and one style.

that no distinct difference of species is easily to be discovered. The following sorts, however, appear to be distinct species ; and, among them, are grapes of the first and best quality §||§.

1. WHITE MUSCAT OF ALEXANDRIA.

The berries of this species are large and oval ; and, when perfectly ripe, are of a fine amber colour. The skins are thick, and the flesh, or pulp, hard, and not very juicy, but of a most exquisite muscat flavour. The berries hang loosely, and compose long well-formed bunches.

This grape is in great estimation, and is at present, more generally planted in hot-houses than any other sort. *

2. BLACK DAMASCUS.

The berries of this species are large, round, and of a fine black colour ; the skin thin, and the flesh delicate, rich, juicy, and of an exquisite flavour.

The same bunch commonly consists of berries of different sizes ; the small berries are without stones, and the large ones contain only one in each berry. This, although a late grape, is a most excellent and very valuable sort. *

3. BLACK GRAPE FROM TRIPOLI.

This grape seems nearly allied to the former

§||§ An asterism (*) marks the proper sorts for a hot-house.
— A dagger (†) for a vinery. — A double dagger (‡) for a common wall.

species; but the bunches are always composed of large berries of an equal size, and with one stone in each. This circumstance of the berries being equal in size, renders the bunches of a more agreeable appearance. The foliage in both is exceedingly beautiful in the autumn, and very similar. This may be reckoned a truly valuable grape. *

4. ALEPPO GRAPE.

This is a middle-sized roundish grape, with a thin skin, and delicate juicy flesh. The colour is commonly very various. I have seen on the same bunch some berries quite white, others entirely black, but the major part are curiously striped with black and white. Sometimes a berry will be one half white and the other half black: but what appears most remarkable is, that the colours do not intermix, but are divided by straight lines, as if painted. The leaves of this sort are in the autumn very curiously striped, with red, green, and yellow, something similar to the Aleppo lettuce.*†

5. RED GRAPE FROM SYRACUSE.

This is a very large grape, of a red colour, and of an oval figure, somewhat irregularly formed. The berries hang rather loosely on the bunches, which are pretty large. This noble grape is but little known in this country. *

6. LE COEUR GRAPE, OR MOROCCO GRAPE.

This species produces large berries, in figure

somewhat heart-shaped, and of a tawny grizzly colour. The bunches are often composed of unequally-sized berries, some of them being exceedingly large. These never contain more than one stone a-piece, and the lesser-sized berries are always without stones. The foot-stalks of the berries are short, and singularly large, differing from most other sorts. This is a much-esteemed grape, and is very scarce. *

7. GOLDEN GALICIAN.

The berries of this species are large, and of an oval figure; the flesh hard, but of a tolerable flavour. These, together with the foot-stalks, are of a light yellow colour. *

8. BLACK MUSCADEL.

Of this species the berries are large, oval, and of a black colour; the skin thin, with a delicate juicy flesh.

The same bunch contains berries of different sizes, some of them very large and long, but somewhat compressed and flat at the ends. The leaves of this grape change in autumn to a beautiful scarlet. *

9. RED MUSCADEL.

The berries of this sort are large, oval, and of a beautiful red colour; the skin is thick and the flesh hard, something like the raisin grape. The bunches frequently arrive to six or seven pounds,

and are most elegantly formed of berries of an equal size. This is one of the latest grapes. The leaves change in autumn to a beautiful red and green. *

10. WHITE GRAPE FROM ALCOBACA.

This has a large oval white berry, with a thin skin and juicy flesh. The bunches are large and long, without shoulders.

This species, with many others, was sent me from Portugal by my much-esteemed friend, Gerard de Visme, Esq. *

11. WHITE FRONTINAC.

The berries of this species are round, of a moderate size, and of a greenish yellow, and compose long unshouldered bunches. * † †

12. GRIZZLY FRONTINAC.

The berries of this grape are somewhat larger than the former, are round, and their colour brown and red intermixed with yellow. Both these sorts of grapes possess a high, musky, perfumed flavour. * †

13. BLACK, OR PURPLE FRONTINAC.

The berries of this species are black, but when produced under glass are generally of a dark purple colour, are moderately large, round, and of a most excellent flavour. They compose very long bunches. This has been hitherto generally

called the Red Frontinac, and is one of our very best grapes. I had it from the Cape of *Good Hope* by the name of Black Constantia. *†

14. BLUE, OR VIOLET FRONTINAC.

This has a small black berry, powdered with a fine blue or violet bloom, and is of an exalted vinous flavour. The berries grow close upon the bunches, which are very small. This is commonly called the Black Frontinac, but the French name it *Muscat Violet*. † ‡

15. RED FRONTINAC.

The berries of this fruit are of a moderate size, round, and of a fine red colour, and high flavour. The berries grow close upon the bunches, which are of a moderate size. I must beg leave to observe, that I have only seen two or three bunches of this grape, produced here last summer, from a plant (which came from France the preceding year) growing in a pot about a foot diameter.

It is undoubtedly the *true* Red Frontinac, which has induced me to change the names of the two foregoing species. *†

16. WHITE SWEETWATER.

This is a very large round white grape. The berries grow close on the bunch, which is of a moderate size, and are replete with an agreeable juice. The skin and flesh of this grape are more delicate than of any other sort. In some situations,

the berries on the sides of the bunches, next the sun, are clouded with spots of a russet colour, and they are then generally most admirable. This grape is propagated in the Forcing-houses in *Holland*, in preference to any other sort. It is by the Dutch called *Parel druif*. *†

17. BLACK SWEETWATER.

The berries of this species are much smaller than the former, are black, grow in small short close bunches, and are replete with a very sweet juice. The skin being thin, and very subject to crack, it is an improper grape to be propagated in a Hot-house. †

18. BLACK HAMBURGH, OR *Warner's Grape*.

The berries of this species are large, inclining to an oval figure, and of a black colour. They hang loosely on the bunch, and compose well-formed handsome bunches.

The skin is thick and the pulp hard; but notwithstanding these defects, it is a very valuable grape, being a good-flavoured fruit and a plentiful bearer. *†

19. RED HAMBURGH, OR *Gibraltar Grape*.

The berries of this sort are of a dark red, with thin skins and juicy delicate flesh. The size and figure of both the berry and bunch are nearly like the former. *†

20. WHITE HAMBURGH, OR *Portugal Grape*.

This has a large oval berry, with a thick skin

and hard flesh. As this species is a very plentiful bearer, and forms large bunches, it is much admired by some, but is not so valuable as either of the two preceding kinds. *

21. MALVOISE, OR *Blue Tokay*.

The berries of this species are small, rather inclining to an oval figure, and of a brown colour. The skin is thin and the flesh delicate, replete with a vinous juice; and the berries are powdered with a blue bloom. *†

22. GENUINE TOKAY.

This is a white grape. The berries incline to an oval figure, and grow rather close on the bunch, which is of a moderate size. The skin is thin and flesh delicate, abounding with a very agreeable juice. This species is very distinguishable by the foliage, the underside of the leaf being covered with a fine soft down, having the appearance of satin. This species was sent to his Grace the Duke of Portland, from *Hungary*, some years ago. *†

23. LOMBARDY, OR *Flame-coloured Tokay*.

This has a large round berry, of a beautiful flame colour. The bunches are regularly formed with shoulders, and frequently arrive to the weight of six or seven pounds. The leaves are much more divided than most other sorts, and the upper surface is of a deep green colour. This is by some called the *Rhenish Grape*. *†

24. SMYRNA GRAPE.

This has a large red-coloured berry of an oval figure, with thin skin and delicate juicy flesh. It forms long bunches with shoulders loosely connected. The leaves in autumn die with purple edges. This is a good grape, though but little known in this country.*†

25. BRICK GRAPE.

The berries of this species are small, inclining to an oval figure, and of a pale red or brick colour. They grow close on the bunch, which is very small. This is a very sweet grape, but not much esteemed. ††

26. BLACK SPANISH, OR ALICANT.

The berries of this species incline to an oval shape, are moderately large and black, and form exceeding long unshouldered bunches. The skin is thick, and the seeds uncommonly large. The flesh is soft, juicy, and of an agreeable flavour. The leaves in autumn are beautifully variegated with red, green, and yellow. This is a pretty good fruit, and is sometimes called the Lombardy Grape.*†

27. WHITE MUSCADINE, OR CHASSELAS.

This has a round white berry, is moderately large, with a thin skin, and delicate juicy flesh. The bunch is well formed, and of a pretty good size. This species is generally propagated against

common walls ; and as the fruit is constantly eaten before it is well matured, it is rather in disesteem: But still, when well perfected, it is an exceeding fine grape. The same observation might have been made on the White *Sweetwater*, with equal propriety. *†‡

28. BLACK MUSCADINE.

The berries and bunches of this species are both somewhat smaller than the preceding. This is a very prolific grape, and makes a fine appearance, on account of the black berries being powdered with a bluish bloom ; but the flesh is not so delicate and juicy as the former. I procured a plant of this grape from *Holland* by the name of *Frankendale*. *†

29. ROYAL MUSCADINE, OR *D'arboyce*.

This has a round white berry, of a moderate size, a thin skin, and a juicy soft flesh. The bunches are generally exceeding large, sometimes arriving to six or seven pounds. This species is very distinguishable by the wood and foliage generally growing remarkably gross and strong. *†

30. MALMSEY MUSCADINE.

This seems nearly allied to the preceding, but the bunches and berries are somewhat smaller and the juice of a higher flavour, being remarkably sweet. However, as I have only seen the fruit of this sort from a plant growing in a pot, an allow-

ance for the size of the bunches should be made. The berries of this sort afterwards proved much larger, and the whole vine both in fruit and foliage seems much nearer allied to the Syrian than the D'arboyce. *†

31. CLARET GRAPE.

The berries of this species are small, black, and inclining to an oval figure; they grow close, and form small bunches. The juice is of a blood-red colour, of a harsh taste, excepting the grapes are perfectly matured, and then it may be considered rather as an agreeable delicate fruit. The leaves change from green to a russet-red early in summer, and die a deep red in autumn. *†

32. SYRIAN GRAPE.

The berries are white, large, and of an oval figure; the skin is thick, and the flesh firm and hard; the bunches well formed, and enormously large. Now, though this is generally considered as a coarse fruit, it has properties that ought to introduce it into every large collection, and especially the Hot-house. It is very prolific, and the bunches commonly grow very large, making a most noble appearance, and when well perfected, may be called a very eatable fruit; to which I may add, that they may, without difficulty, be kept many weeks longer than any other sort. I have often had them in good perfection in the month of

January, and sometimes even in February. It requires very great thinning. *

33. MILLER'S BURGUNDY, OR *Munier Grape*.

The berries are small, rather inclining to an oval figure, are black, and grow close on the bunch, which is commonly short and small. The skin and flesh are delicate, possessing a sweet and pleasant juice. The leaves are distinguishable from most others by a hoary down, especially when young, being then almost white. ††

34. SMALL BLACK CLUSTERS, OR *Auvernat*.

The berries and bunches of this species are little different from the former, but the leaves have less down, and are somewhat smaller. This is a delicate sweet fruit, and is sometimes called the Burgundy Grape. ††

35. LARGE BLACK CLUSTER.

The berries of this are larger, and grow more oval than the two former species, are black, and not so delicate, the juice being of a harsh and rough taste. The leaves in autumn, when dying, are of a beautiful bright scarlet. This species was sent me from Lisbon, and I was assured it is the identical grape of which red Port wine is made. †

36. WHITE MORILLON.

This has an oval white berry, of a moderate size, with thin skin and delicate juicy flesh. It grows

close on the bunches, which are small. The leaves are soft, being greatly covered with down on the underside, something similar to the genuine Tokay grape, to which it appears nearly allied.

37. EARLY BLACK JULY GRAPE, OR *Morillon Noir hatif*.

This has a small black round berry; the bunches also are small, but it is a prolific bearer, and comes to the table at an early season, even without fire heat. ††

38. CAT'S GRAPE.

This has a small oval berry, of a greenish white colour, with a thin skin and soft juicy flesh. The berries grow close, forming small bunches. The taste of this fruit, before it is quite matured, is exceedingly disagreeable; but, when perfectly ripe, is very sweet, and pleasing to some palates. *†

39. BLACK RAISIN GRAPE.^b

The berries of this species are large, oval, and

^b Raisins are of two sorts; those which are called sun-raisins are made thus: "When the grapes are almost ripe, the stalk is cut half through, so that the sap may not penetrate farther, but yet the bunch of grapes may remain suspended by the stalk. The sun, by darting on them, candies them, and when they are dry, they are packed up in boxes.

"The second sort is made after the following manner: When the Vines are pruned, the tendrils are preserved till the time of vintage: a great fire is made, wherein those tendrils are burnt, and in the lye, made of their ashes, the newly-gathered grapes

black, with a thick skin and a hard firm flesh. It forms long handsome bunches. *

40. WHITE RAISIN.

The properties of this grape are nearly similar to the preceding, but the berries are white. *

are dipt*, after which they are exposed to the sun to dry, which renders them fit for use.”—*Travels through Portugal and Spain, in 1772 and 1773, by Richard Twiss, Esq. F. R. S. p. 334.*

* Mr. Swinburne, in his travels through *Spain*, p. 208., informs us, that the raisins dried upon the coast of *Valencia* are dipped in a lye of *wine* and ashes.

The same ingenious author says, p. 167, “Immense are the hoards of all species of dried fruits, such as figs, raisins, plumbs, &c. They have also the *secret* of preserving grapes, sound and juicy, from one season to another.”

It is much to be regretted that this Gentleman could not procure and import the above most invaluable *secret*.

I have constantly kept grapes a long time by the following method: Before the autumnal frosts have killed the Vine leaves, let the bunch with the shoot be carefully cut off the vine. Then put the lower end of the shoot into a bottle filled with water: Hang up the bottle with the shoot and bunch in a warm room. A Green-house is a very proper place.

Only two or three joints of the shoot above the bunch should be left, but a sufficient length below, to reach the bottom of a quart bottle, will be required.

The bottle should be filled with fresh water every twelve or fourteen days; and at the same time a thin shaving should be cut off the bottom of the shoot whereby the pores will be made to imbibe the water with greater facility.

Grapes produced in Pine-stoves require to be cut at the pruning season, viz. in December.

By this method I have often kept grapes fresh and good till the middle of February.

41. DAMSON GRAPE.

The berries of this species are very large, oval, and of a beautiful purple colour. They grow loose on the bunch, which is large. The leaves of this grape are large, and more thick and succulent than those of any other sort, and have something of the appearance of green leather. *

42. EARLY WHITE GRAPE FROM TENERIFFE.

The berries of this species are round, white, and of a moderate size, with thin skins, and delicate juicy flesh of an extraordinary sweetness. The berries and branches much resemble the common Muscadine, to which it appears to have a near affinity. ††

43. ST. PETER'S GRAPE.

This has a pretty large berry, nearly globular in figure, and of a black colour; the skin is thin, and the flesh very delicate and juicy. This Vine produces large bunches, but as the berries are very subject to crack, it is not generally planted in Forcing-houses. The leaves are much more divided than those of most other sorts. *

44. BLACK GRAPE FROM PALESTINE.

This appears nearly similar to the preceding. But I have only seen two bunches of this grape, the product of a plant growing the last summer in a pot, and engrafted last spring; and though its situation was in the Hot-house, not a single berry

cracked in either of the bunches; it may probably, therefore, be a distinct species. N. B. This afterwards proved a variety of the former species. *†

45. WHITE PARSLEY-LEAVED GRAPE, OR CIOTAT.

This is a species of the parsley-leaved grape. The berries are round, white, of a moderate size, with thin skins and delicate juicy flesh, which is very sweet, but not of a vinous flavour. The bunches are of a pretty good size, almost similar to the White Muscadine. The leaves are finely divided, differing from any other sort. — There is a species of the Parsley-leaved Grape which produces *red* berries. †

46. BLACK LISBON.

This has a large globular berry, black, thin-skinned, and juicy. It has also large-shouldered bunches, which not a little resemble the Black Hamburgh. It is a pretty good grape, but scarce in this country. *†

47. GREEK GRAPE.

The berries of this species are of a moderate size, rather inclining to an oval figure, of a bluish white colour, and grow close, forming moderate-sized handsome bunches. The leaves grow on very short foot-stalks, and bear a resemblance to those of the *Sweetwater*. It is a delicate and justly-esteemed fruit. *†

48. WHITE CORINTH GRAPE.

This has rather a small white round berry, with a thin skin, and very delicate juicy flesh, of an agreeable flavour. The bunches too are rather small. The berries, when perfectly ripe, are transparent, so that the seeds appear very distinctly. †

49. WHITE MUSCAT, from *Lunel*.

The berries of this species are large and oval, and, when perfectly ripe, are of a fine amber colour, sometimes clouded with brown or russet, especially on the side next the sun. The skin is thin, and the flesh delicate, replete with a vinous juice. As this grape is a very plentiful bearer, and forms pretty large bunches, it may justly be deemed a valuable sort, though at present but little known in this country. *†

50. CORNICHON.

This is a remarkable-formed grape. The berries are above one inch and a half long, their breadth not half an inch. They taper from the stalk, (but not in a regular manner) and end in a blunt point, according to the French, something like a horn: but its figure is more like the long end of a small fish's bladder. The berries are white, with a thick skin and a firm sweet flesh. *

I might add to the foregoing list, two or three seedling grapes that have borne fruit; one of them is the produce of the Black Frontinac, impreg-

nated by the White Sweetwater, and may be considered as a valuable sort. The berries are black, like its parent, but the bunches are composed of unequally-sized berries, like the Sweetwater, and ripen early in the season.

I have not attempted to place the various sorts in the foregoing list, according to the due order of their ripening, because the late kinds are the fittest to be propagated in the Hot-house, which in this work is to be considered as the first object.

It might, by some, perhaps be expected that I should announce the flavour of every sort of grape here mentioned and described: but I am very reluctant as to that particular, as persons' palates are so very various; and I have frequently found and observed, that many sorts of grapes, which have by some been highly commended, have by others been greatly disapproved.

I shall here beg to remark, that I have observed that the leaves of white grapes in general, when mature, constantly change to a yellow colour, and are never in the least tinged either with purple, red, or scarlet. The leaves of the Claret Grape change to a dark blue and russet green early in the season. Those of the Blue Frontinac and Black Muscadine, change late in the season to a beautiful scarlet and yellow, intermixed.

The leaves of the Aleppo Grape are curiously striped with red, green, and yellow: the Muscadel, Smyrna, Morocco, Black Damascus, Grizzly Frontinac, and the Black Spanish or Alicant, are also exceedingly beautiful.

The leaves of the pale-red and grizzly Grapes are not always tinged with red; but whenever the least tinge of red, purple, or scarlet appears on the leaves of the vine at the time of their maturation, it is a certain criterion that the grapes will be either of a grizzly, a red, or a black colour. By a strict attention to this remark, a person may be enabled to ascertain the colour of the grapes of Seedling Vines at the end of the first year.

Although the situation and climate of this country be too unfavourable for bringing the best kinds of grapes to perfection in a natural way, yet, by artificial means, we are enabled to carry even the latest ripening sorts to almost as high a degree of perfection as in any part of the globe.

The most certain methods of obtaining grapes in perfection in this country, are either to propagate the Vines in pine stoves, or against flued walls covered with glass, commonly called Vineries.

In some seasons there are many kinds of early grapes brought to a tolerable degree of maturity against common walls; but even in a propitious season, the best sorts of grapes thus produced are of little value; whereas even the latest sorts, when propagated in a pine stove or Vinery, seldom fail of producing crops of well-flavoured grapes.

The management and method of training Vines in the Hot-house being very different from that of propagating them in a Vinery, it will be proper and expedient to treat the two modes separately.

ON THE
MANAGEMENT
OF THE
VINE IN THE HOT-HOUSE.

IN the first place, situation and soil are maturely to be considered. Every Hot-house should either be built on a dry soil, or where the situation is capable of being made so ; because it is absolutely necessary that the pine pits should be perfectly dry : and these are generally to be sunk about four feet below the surface of the circumjacent ground, on the outside of the building. There should be a drain in the front of the stove, to carry off the water that falls from the roof ; and this drain should be as low as the foundation of the building, and close adjoining to its front wall.

If the ground be wet or springy, the soil either a barren sand or cankered clay, it will be requisite to use all necessary expedients to prevent the roots of the Vine from entering into them ; and as they are to be planted immediately over the drain adjoining the front of the Hot-house, it will be indispensably necessary also to make the drain perfectly secure both on the top and sides.

Parallel to the drain adjoining the front of your Hot-house, another drain should be made at the distance of about 18 or 20 feet, and this ought to be sunk six or eight inches below the level of the former drain ; the bottom floor of the Vinery will then admit of an easy descent, so that the water may readily be drawn off from the roots of your Vines.

When the soil comes under any of the above descriptions, a bottom floor should be made to prevent the Vine-roots from penetrating it. This floor must be made of such materials as chippings of stone, coarse gravel, broken bricks, &c. and these must be laid quite as low as the bottom of both the drains, and to the thickness of eight or ten inches. They should be well beaten together and made smooth.

Over these materials, or foundation, there should be put a thin layer of fine loamy soil, quite free from swarth or stones. This should be well watered, and worked over with a spade till it is quite soft, so as to have the appearance of a fluid mass ; for then it will entirely fill up the chinks in the under-bed of stone, &c. and also form a covering, and unite with it so thoroughly, as to make and compose a firm bed, almost as impenetrable as a rock. ^c

^c This method of tempering soil is in general practice with engineers and persons employed in making navigable canals or large pieces of water. It is by them termed “puddling,” and is deemed the best expedient hitherto found out to render ground water-proof.

In many places, Hot-houses are built where the soil is of so unfavourable a nature, that it would be next to impossible to have Vines in perfection without the above contrivances and precautions ; for when the soil is wet and springy, as stated above, is a strong clay, or otherwise unkindly, the Vine-roots, by penetrating deeper than the sun's influence, will imbibe crude particles, which will not only tend to render the Vine unfruitful, but also impregnate its small produce of grapes with a disagreeable flavour. But when the above directions are strictly attended to, there will be a certain space of six or eight yards in breadth, and the entire length of the stove, made perfectly secure from all noxious and heterogeneous matter : therefore the next important object will be a consideration of a proper soil or compost.

As the Vines in the Hot-house at Welbeck have been remarkably fruitful and vigorous, I shall beg leave to recommend the same kind of compost mould which I make use of there, viz. one-fourth part of garden mould (a strong loam) ; one-fourth of the swarth or turf from a pasture where the soil is a sandy loam ; one-fourth of the sweepings and scrapings of pavements and hard roads ; one-eighth of rotten cow and stable-yard dung mixed ; and one-eighth of vegetable mould from reduced and decayed oak leaves. These are the several and respective proportions. The swarth should be laid on an heap, till the grass-roots are in a state of decay, and then turned over and broken with a

spade ; let it then be put to the other materials, and the whole worked together, till the separate parts become well and uniformly mixed and incorporated.

If this business were to be done previous to the building of your Hot-house, it would be the better ; but if time will not allow of that, it would be advisable to bring the above-prescribed materials directly to the spot, and there to mix and mingle them well and sufficiently together, by working them over in the manner of trenching. I will not take up the reader's time in the explanation of any kind of process generally known : in the present case, therefore, it may suffice to say, that before the Vines are planted, it will be perfectly necessary that all the ingredients above mentioned should be completely combined, and so thoroughly mixed, as to constitute a mass perfectly uniform and homogeneous.

Let us now suppose the compost-mould to be ready upon the spot. There let it be raised above the upper margin of the drain adjoining the front wall of the stove, to the thickness of two feet and six inches. The whole space between the two drains must also be raised to rather above that level. As the preparing and finishing the ground in question leads to an important object, and as it should be covered with gravel, and lie in an undisturbed state for some time after it is planted, I am desirous of being a little more explicit respecting the formation of your floor or bed.

I have already observed, that the floor has a fall or descent of six or eight inches inclining to the South ; and here I would recommend, that the surface of the ground upon it should, when finished, be reversed ; that is, that the part at some distance from the Hot-house should be raised five or six inches above the level of the ground immediately adjoining the stove. The ground at each end should also be brought to the same height. In short, the surface of the whole should have an easy fall of two or three inches to a certain point, where a grate should be fixed, to take off the water that falls from the roof of the Hot-house. About the middle of the front wall will be the most convenient place for this purpose, as the ground at each end may be raised to have an easy fall into it. The grate must be laid in a groove cut two inches deep in a smooth stone ; and a second groove, one inch and a half deep must be cut round the former. The intent of this latter groove is to receive a board, which must be made to go in and fit very close, so as to afford an opportunity of floating the ground in front occasionally ; but of this I shall have occasion to speak more at large hereafter. The stone I here speak of must be laid immediately over the drain, adjoining the front wall of the stove, and raised about two feet three inches above the top of the said drain. The ground, including a thin coat of gravel, of about two inches thick, must be laid perfectly even with the top of the

stone, which is the central point for drawing off the water from the surface of the whole.

The ground should be made complete some months before it is capped with gravel, as it will settle very considerably ; and, during the time of settling, boards should be laid over it for persons to walk upon, when they are to give air to the Hot-house, &c. since, otherwise, the ground would be trodden down unequally by their going over it. Your ground being now complete, by allowing proper time to settle, let the whole of the surface be pointed over with a spade to the depth of three or four inches ; and at the same time add fresh compost to make up the deficiency of its settling. Then tread it firm, and rake it smooth, and lay the gravel about two inches thick upon every part, except the very places where the Vines are to be planted. Tread also the gravel, and rake it smooth ; after which a light roller should be run over it ; and thus the whole business of the preparation will be finished. However, I shall just add, that if the gravel were made fine, and afterwards divested of the sandy particles, which may easily be done by twice screening or sifting, it would make the walk in the front of the Hot-house both neater and better ; for when the gravel is of a sandy nature, it is not only inclinable to grow soft in a wet season, but the small particles of it are also liable to be blown upon the roof of the Hot-house in dry windy weather.

It may seem unnecessary to observe, that as the depth of the mould adjoining the front wall of the stove is two feet six inches, and the depth at the South drain three feet six inches, the whole will run at the medium depth of one yard : and as the breadth of the floor, eighteen feet, and the Vines standing at three feet six inches apart, the distance between the rafters, each plant will occupy, at an average, a space containing seven superficial yards, and, consequently, as many cubic yards of compost.

Having thus gone through with the preparation of the ground where the soil and situation are both unfavourable, I shall now endeavour to give a few hints that may be useful, when either of these articles are differently and better circumstanced.

A garden, and consequently the Hot-house, is sometimes so happily situated in regard to soil, that it seems, by nature, adapted to the growth of the Vine^d. The best soil, in my apprehension,

^d The following extract from Virgil, on this topic, will be deemed neither unapplicable nor disagreeable to the candid reader :

The nature of their several soils now see,
 Their strength, their colour, their fertility ;
 And first for heath, and barren hilly ground,
 Where meagre clay and flinty stones abound ;
 Where the poor soil all succour seems to want,
 Yet this suffices the Palladian plant.
 Undoubted signs of such a soil are found,
 For here wild olive-shoots o'erspread the ground,
 And heaps of berries strew the fields around.

and indeed the soil in which I have known the Vine to prosper in the most superlative degree without artificial aid, was a kind of rich, sandy loam, intermixed with thin beds of materials like jointed slate, or stone, so very soft in its nature, as almost to be capable of being crumbled between the fingers. The roots of the Vine delight in these beds of loam.

I have been more particular in the above description, on a supposition that spots of such kindly materials may sometimes be found; and whenever it so happens, I would, by all means, recommend a plentiful use of such soil in preference to any other, and especially for the part below; for even in the former case of the unfriendly soil, the Vines would possibly succeed still better with a layer of this sort between the compost-mould and bottom floor.

But where the soil, with fat'ning moisture fill'd,
Is cloth'd with grass, and fruitful to be till'd :
Such as in chearful vales we view from high ;
Which dripping rocks with rolling streams supply,
And feed with ouze ; where rising hillocks run
In length, and open to the southern sun ;
Where fern succeeds, ungrateful to the plough,
That gentle ground to generous grapes allow.
Strong stocks of Vines it will in time produce,
And overflow the vats with friendly juice ;
Such as our priests in golden goblets pour
To gods the givers of the chearful hour.

Dryden's *Virg. Georg.* ii.

When either a Pine and Vine Stove, or a Vinery, are intended to be made, and the soil happens to be such as has been described, or similar to it, and especially if the bottom be a dry bed of strong gravel, a kind of slate stone, or rocky, an artificial floor in either case will be unnecessary, since the pine pits need not then be sunk below the natural soil, as in the common method, but raised above it. The ground on the outside of the building must afterwards be brought up to a convenient level, and it will then form a kind of terras or bastion. By this means the roots of the Vine will be benefited in a double respect, both by an additional soil, and by having the natural one for its bottom or floor.

I do not in all cases recommend the various proportions exactly, for making the foregoing compost, but would advise, nevertheless, that each be varied in a greater or less degree, according to its quality. Nay, it sometimes may be found necessary to substitute a soil still different from either of the foregoing. As when, for instance, a garden soil happens to be rich, strong, and inclinable to clay, and when a sandy loam cannot conveniently be had ; for in such a case, common sand, or rather the reduced swarth or turf from a sandy soil, although poor in its nature, will not only correct, but greatly improve it, by opening its pores, and rendering it light, and thereby making the passage more easy for the progress of the roots of the Vine. It appears a contradiction in terms,

I confess, to say that a good soil will admit of being improved by a mixture with a bad one, but yet so it is, since although you may conceive the primogenial soil to be sufficiently good and proper for the purpose, it is, nevertheless, evinced by experience, that it will admit of improvement, and will be much benefited by having the various soils above mentioned judiciously mixed and well worked together.

As the vegetable mould from decayed leaves, which I just mentioned above, cannot always be obtained, by reason that the leaves require to lie two years before they become sufficiently putrid and reduced; it therefore may sometimes be necessary to substitute some other ingredient in lieu of this part of the compost; wherefore it may not be inexpedient to point out the proper succedanea.

Rotten wood reduced to a fine mould, such as is often found under faggot stacks; the scraping of the ground in old woods, where the trees grow

• The spontaneous fruitfulness of the ground was a thing peculiar to the *primogenial* soil, (by which I mean the original mould at the creation and after the flood), for that was so tempered as to be more luxuriant than it could ever be afterwards; and, therefore, as that rich and proper temperament was spent, so by degrees it grew less fertile. “The fruits of the earth were, at first, spontaneous, and the ground, without being torn or tormented, satisfied the wants or desires of man. When nature was fresh and full, all things flowed from her more easily and more pure, like the first running of the grape, or of the honey-comb; but now she must be pressed and squeezed, and her productions taste more of the earth and bitterness.” — *Burnet's Theory of the Earth*, vol. i. page 225.

thick together ; mould out of hollow trees, and saw dust, reduced to a fine mould, provided it be not from wood of a resinous kind, are, in part, of a similar nature with vegetable mould from decayed leaves, but are neither so rich nor powerful, because the vegetable mould receives a power by its fermentation, as I have observed in the section on the use of oak leaves.

It is very probable that there are various other kinds of manure, that may be introduced into a compost suitable for the Vine, with as much effect as the former^f ; as blood, the offal of animals, or shambles, horn shavings, old rags, hair, shavings of leather, and bone dust. This last is exceedingly proper, as at the same time that it gives a lightness to the soil, it contributes to its fertility.

I may also add to the former, the dung of deer and sheep, as likewise human ordure. But please to observe, that many, if not all of the above recited manures, will require time to meliorate, before they can be introduced and incorporated with the other parts of the compost ; wherefore, being collected, and mixed with garden mould, they may be thrown up in an heap, in any convenient place in your garden.

A winter's exposure, with frequent turning over during that period, especially in frosty weather,

^f Since the publication of the former edition of this Work, the late Mr. Wedgwood obligingly informed me, that some Vines he planted in the ashes, &c. of his Potteries, had grown with a degree of luxuriance beyond any he ever saw.

serves wonderfully to meliorate and hasten their dissolution. The influence of a summer's sun will not be less beneficial, by exhaling their crude particles, and, by sweetening the parts, preparing them the more immediately for vegetation. — Having recommended so large a proportion of the dirt, or scrapings, of hard roads and pavements, to enter into the vineal compost, it may not be improper to bring this material again under consideration.

The dust, or dirt from roads, consists principally of the following particulars : First, the soil of the vicinity ; secondly, the dung and urine of horses and other animals ; and thirdly, the materials of the road itself when pulverized. Various other matter may be brought by winds, and by other means, but the foregoing may be deemed the principal. The first of the above articles is brought to roads by the wheels of carriages, and the legs of horses and other animals ; the last is the worst part of the materials, as the dust and scrapings from roads, made and mended with soft stone that grinds fast away, is much inferior in its vegetating quality to that which is collected from hard roads. On the whole, however, this ingredient of compost from the roads is unquestionably in general of a fertile nature, which may be attributed in part to the dung, urine, and other rich materials of which it is composed ; and, in part, to a kind of magnetic power, impressed upon it by friction, and its perpetual pulverization.^s

^s “ I think it would be evinced, as constant and undeniable, that, amongst the mechanical aids, (wherein stercoration has no

The nature of this road-earth ought to be duly considered when used in the Vine-compost, and its proportion adjusted according to its quality. In a sandy country it will naturally abound with particles of sand, and long and continued rains will, of course, wash away its best parts. High winds too, in dry weather, will as certainly deprive it of its lightest and finest parts, especially when roads lie on eminences, or enjoy an open exposure. Those

hand) that of pulverizing the earth by contusion, and breaking it with a plough or spade, is of admirable effect, to dispose it for the reception of all the natural impregnations. For the earth, especially if fresh, has a certain magnetism in it, by which it attracts the salt, power, or virtue, (call it either) which gives it life. Take of the most barren earth you can find, drained, if you please, of all its nitrous salts and masculine parts, reduce it to a fine powder, (which may be done, even in large proportion, by a rude engine, letting fall a kind of a hammer, or beetle, at the motion of a wheel) let this pulverized earth, and for the time incessantly agitated, be exposed, for a summer and winter, to the vicissitudes and changes of the seasons, and influences of heaven. By this labour and rest from vegetation, you will find it will have obtained such a generous and masculine pregnancy, within that period, as to make good your highest expectations; and to this belongs Sir Hugh Platt's contrition or philosophical grinding of earth, which upon this exposure alone, without manure of soil, after the like revolution of time, will, as he affirms, be able to receive an exotic plant from the farthest Indies, and cause all vegetables to prosper in the most exalted degree; and to bear their fruit as kindly with us as they do in their natural climates." For a further account of this curious and important subject, see page 27 of the last edition of Evelyn's *Terra*, with Notes by Dr. Hunter.

materials, therefore, from roads, are generally preferable, which are produced from an inclosed track in a low situation : pavements, however, and hard roads, produce the best culture of all. This compost is much better when collected in a moderate dry state, than when it is either very wet or dusty. If scraped off the road in a wet and soft state, when it is become dry it will be hard and cloddy, and will require time to bring it to a proper condition. When thus circumstanced, the best way of recovering it is, to give it frequent turnings in hard frosty weather.

The dust and scrapings of roads are not only proper for Vines, but also agree with plants in general^h, and being mixed in an equal proportion

^h In some kinds of moory or fenny soils, it formerly was found difficult to get sets of either the Willow or White Thorn to strike root, though it was observed, that the few plants of both, that chanced to take, generally grew remarkably luxuriant afterwards, and were very durable.

It is probable, that such soils greatly abound either with a sulphurous or an unctuous quality, so as to overpower the plants when newly set.

The scrapings of roads, and the dirt of streets, are found to be effectual in remedying this complaint.

In some parts of the Isle of Ely, and the adjacent low and moist country, it is now become a general practice to carry the road-earth many miles for this purpose. At the time of planting, a few handfuls of this substance is put round each set, and a quantity just sufficient to keep the natural soil from touching the bark of the plant, is found to be quite adequate to the purpose. By this mode of practice, numbers of willow trees are raised with the greatest certainty, and fine white thorn hedge-rows now form and furnish the boundaries of those in-

with vegetable mould from decayed leaves, make an excellent compost for most kind of plants that grow in pots.

After having specified various kinds of manures that are known to be friendly to the Vine, it may not be improper to mention some others that seem to be hurtful and inimical to itⁱ. Soot, wood-ashes, pigeon and hen's dung, would all, I think, be too hot for the root of the Vine. These, if you please to consider, are manures that come immediately into action; and, therefore, are more properly calculated for top-dressing, and to enliven the surface, than to be buried at the roots in the ground below. Pond-mud and moor-earth would probably, on the contrary, be too cold for that

closures, which, formerly, were only separated by ditches, to the great benefit, as well as ornament, of the country.

My own eyes have been witnesses of the above curious and important fact; and I have a brother, who, at this day, occupies a farm in that country, and still pursues this mode of practice.

ⁱ “ And here the nature of the land should be maturely considered, for we should endeavour, by all means, to detect, as far as we are able, the quality predominant, both of the earth we should improve, and the compost we apply, and not throw them promiscuously upon every thing, without considering of what temper and constitution they be, for grounds are as nice as our bodies, and as obnoxious to infirmities upon every defect and excess; and, therefore, it requires skill and no little study to be able rightly to marshal this *materia medica* (as I may call it) of composts, the virtue of which does, sometimes, lie very hidden.” *Evelyn's Terra*, p. 54.

purpose ; and the latter, perhaps, be liable to canker the roots of the Vine ; and therefore, on that account, had better be omitted. These auxiliaries would, doubtless, be very proper for gardens, planted on a sandy soil, and mixed, as we will suppose, with the common soil of the quarters that produce crops of vegetables for culinary use. Stable-yard dung would be too spirituous, hot, and fiery, were it to be introduced into the compost, before its heat was thoroughly abated ; and, I fear it would be liable, by its sinking, to cause the border to settle too much after the gravel was laid upon it.

I am fully persuaded that the Vine is frequently injured by the common custom of putting improper dung into the borders, for dung should not be permitted to approach the roots, till it be perfectly reduced to a kind of black mould.

Lime will, it is said, lend a friendly aid to the Vine ; and, indeed, it is possible that some kinds of lime may possess that useful quality, for lime differs as much in its nature as land does. Lime made of the *peak* stone is of a rich and mild quality, and is used, with the greatest success, as a top-dressing for grass-lands, and its good effects are very lasting ; indeed, it is asserted, that land will be benefited by a coat of this lime for the space of eighteen or twenty years. This species of lime might, in all probability, be of great service, if admitted into the Vine-compost ; but I am persuaded that there is something too powerful,

if not pernicious, in lime of a different quality; and that Vines are greatly injured by the common practice of laying lime-rubbish for the bottom floor in the preparation of the ground; this floor being intended to give a check to, but not to injure the roots of the tree. On this account it would be prudent to discard the use of it in this mode of application.

Having thus duly considered the various soils, manures, and compost, and shown which are the most salutary for the Vine, and which ought to be omitted; and having given such directions as, I am willing to hope, will be found ample and sufficient to enable a person to proceed with fair hopes of success, in most soils or situations; I shall now proceed to lay down and describe the most eligible method of raising Vine-plants. And here I am extremely happy in having something, not less important than new, to communicate on this subject; indeed I should be extremely reluctant to offer any method, different from the general mode of practice, merely on account of its novelty; but novelty, when attended by superior excellence, is, certainly, a great recommendation.

The Vine admits of being propagated various ways:—First, by seeds; secondly, by layers; and, thirdly, by cuttings. This tree can also readily be propagated by grafting and inoculation.

The Vine may easily be propagated by seed; for seed, carefully preserved through the winter,

risers very freely, and especially from the seed of grapes brought to an early maturity.

This, undoubtedly, is the only way to obtain new kinds of grapes; but, nevertheless, it is little practised, partly on account of the distant prospect and length of time, and partly from the hazard of obtaining better kinds than the original grapes from whence the seeds were taken. The prospect, however, is not so distant as many persons may imagine; for a seedling Vine, judiciously managed, will produce fruit the third or fourth year; and as to the doubtfulness of obtaining better sorts of grapes than the original, it certainly will be but too well founded, should you make your experiment with seed indiscriminately saved; but when proper care and attention is had to the seed you sow, the prospect will wear a more favourable aspect, and the very best species may be hoped for, and reasonably expected.

When Vines are intended to be raised from seed in hopes of procuring new kinds of grapes, that design ought ever to be kept in view. In hot-houses, where various sorts of Vines are trained, it is an easy matter to bring the branches of two different kinds together, and it may be best done at the time of pruning. As soon as the Vines show their fruit, the young branches of each should be so brought together, that the bunches of two different kinds, in the same state of maturity, may admit of being entwined; whereby the two bunches being in flower at the same instant, and

the parts of fructification brought together, there will, undoubtedly, be a mutual impregnation, from which it may reasonably be expected, that new and improved kinds of grapes will be produced.

Great regard, however, should be had in respect of the sorts intended to be brought together, and the advantages to be gained by this junction should be duly considered. They are principally the following : — First, a superiority in size, both in the bunch and the berry ; secondly, a super-excellency in flavour, and a delicacy in the skin and flesh of the fruit. The form of the bunch, and the length of the foot-stalk of the fruit, are also valuable objects, and ought to be considered as advantages, close-growing grapes, which always have short foot-stalks, being subject to many misfortunes.

The advantages to be gained by this method of proceeding being thus shown and displayed, I shall beg leave to make a few observations on the manner of reducing it into practice. And the hints once given, it will be at the option of persons of taste and genius to run the parallel agreeably to their own fancies.

All the five sorts of *Frontinac* grapes are proper to add an excellency of flavour to other kinds ; but there is a superior richness in the *black*, *blue*, and *red* Frontinacs, and they do not partake so much of the strong muscat flavour as the *white* and *grizzly*

do. But it must be considered that the *blue* Frontinac grows close upon the bunch, and, therefore, only is proper to be coupled with the loose-growing kinds that have long foot-stalks. The white Muscat of *Alexandria* produces large loose-growing bunches, and the berries being very large and well-flavoured, it must be a proper kind to be joined with many other sorts. There is a peculiar delicacy in the flesh of the white *Sweetwater*: it is also a remarkably thin-skinned grape, with large berries; consequently it is a proper kind to couple with various sorts that are small and less delicate. Were the red Frontinac and white Sweetwater wedded together, their union would, probably, produce a very valuable sort, as there would be a good chance of its being both large and delicate, and well flavoured. The Syrian Vine is only admired for producing most astonishingly large bunches^k,

^k This is supposed to be the sort of grape alluded to, *Numbers*, xiii. 23. as it sometimes produces bunches of eight or ten pounds weight and upwards. In the year 1781, a bunch was produced at Welbeck that weighed 19 pounds and a half. It was presented by his Grace the Duke of Portland to the late Marquis of Rockingham, and was conveyed to Wentworth-House (a distance of more than twenty miles) by four labourers, who carried it, suspended on a staff, in pairs, by turns. Its greatest diameter, when hanging in its natural position, was 19 inches and a half; its circumference four feet and a half; and its length 21 inches three quarters.

The following curious and important note on this extraordinary bunch was written at that time by my much-esteemed and learned friend, the Rev. Samuel Pegge, of Whittington, by whose permission it is here inserted:

and therefore, I would not advise the joining this coarse sort to any other except the following, as in

“ Our fruits, as well as our animals, are always found somewhere in a natural state, and so we read of *wild Grapes* in Syria, *Isaiah*, v. 4. including Palestine, or the Land of Canaan, in Syria, as we are authorised to do.

“ The Vine, however, soon became an object of improvement and cultivation, since Noah, after the Flood, *planted a Vineyard*, *Gen.* ix. 20. and is from thence supposed, by several learned men, to be the Bacchus of the Greeks, and Janus of the Latins; the name of this latter being derived from an oriental word, signifying *wine*.

“ This part of the world produced anciently, both large grapes and large bunches; for when the twelve spies were sent by Moses, then in the Desert or Wilderness, to view and reconnoitre the southern parts of the land of Canaan, they came unto the brook of Eshcol, and cut down from thence a branch with one cluster of grapes, and they bare it between two, upon a staff. *Num.* xiii. 23. How large the branch, cut with the cluster, might be, is not known; and, perhaps, this mode of carrying might be owing not so much to the weight of the branch and its cluster (since one man could very well carry both, though they should weigh 40 or 50 lbs.) as that the cluster being to be exhibited and shown to the people on their return, it was necessary to preserve the fruit fair, whole, and unbruised: however, it is to be presumed, that the cluster was singularly large and fine, the tenor of the narration evidently implying that.

“ But as to the largeness of the bunches in this quarter of the world, Strabo, who lived in the reign of Augustus, testifies, that the Vines in Margiana and other places were so big, that two men could scarcely compass them with their arms, and that they produced bunches of grapes *two cubits* or a yard long, which is more than a foot longer than that vast bunch produced by his Grace the Duke of Portland at Welbeck.

all likelihood the offspring would only produce bunches much less ponderous. But the white Muscat of *Alexandria* having larger berries and longer foot-stalks, there would be a probability of producing a kind between this and the Syrian Grape that would exceed the original parents both in size and flavour. Although the *black Hamburgh* is a thick-skinned grape, with coarse flesh, yet it has many good properties: it is a fine vigorous-

“ We should probably have heard more of the enormous clusters of grapes growing in these Eastern parts, if the country ever since the seventh century, when Abubeker over-ran it, had not been in the hands of the Saracens, who, being Mohammedans, were not permitted the use of wine, and, consequently, would entirely neglect the management and culture of the Vine.

“ But though the Mohammedans of Syria did not propagate the Vine, nor drank any wine but by stealth and trespass, yet there were always some Christians mixed amongst them, who took care to cultivate the tree for their own use, though they made not its juice an article of merchandise or of exportation; and their clusters of grapes were often, no doubt, of the very largest size and dimensions. This may be inferred from what we find in Huetius, ‘ that Crete, Chios, and other Islands in the Archipelago, afford bunches of grapes of 10 pounds weight; some times of 36, yea of 40 pounds;’ far exceeding the Duke of Portland’s bunch.

“ But still it is a most extraordinary phenomenon in this country, that a Vine, though of the Syrian kind, should by care and judgment, and proper cultivation, be made to produce a cluster of 19 pounds and a half; and it redounds much to the honour, both of his Grace and Mr. Speechly, whose admirable skill in his profession is otherwise so well known to the public.

“ SAMUEL PEGGE,

“ *Whittington, Oct. 10. 1781.*”

growing Vine, that will stand forcing, and is a very plentiful bearer. The bunches too are generally large, and furnished with well-sized berries, of a tolerable flavour. These again, having long foot-stalks, do not want much thinning; and therefore are not liable to decay, as in the case with most close-growing kinds. If this sort were to be coupled either with the *white* Frontinac or Sweetwater, there is great reason to suppose that the offspring would be an improved kind.

The following kinds also admit of a junction with great propriety, viz. the black *Damascus* and grizzly Frontinac—the flame-coloured *Tokay* and red *Frontinac*—the white Muscat of *Alexandria* and white Sweetwater—the black Frontinac and white Muscadine—the St. Peter's Grape and white Muscat of *Alexandria*. It is probable that some of the foregoing advantages might be gained by an alliance between various other kinds; but I shall forbear to recite any further examples, enough having already been said on this subject to stimulate persons of taste and curiosity to pursue an amusement that, one may venture to pronounce, will contribute both to their advantage and pleasure.

It is evident that the present very extensive variety of valuable kinds of grapes have been obtained from seed, either sown by hand and raised with care, or from seed accidentally let fall by birds, or by other chances, whilst the grapes continued in their wild state.

I shall go so far, on this occasion, as to augurate,

that the best sorts of grape, hitherto known, will, at some future days, be esteemed only as secondary or inferior kinds. Since we know that the collection of gooseberries have been improved by seed, within the space of a few years, to a most astonishing degree, surely, with the same care, attention, and public encouragement¹, as much may be done in the list of Vines. This I can aver, that the method of raising seedling plants is neither uncertain nor difficult; as seed from grapes, perfectly ripe, will vegetate with the utmost facility and certainty. In this place it will be necessary to observe, that the bunches entwined together should be separated as soon as the *farina* has fallen and the grapes begin to swell, as the important parts of fructification have then performed the office for which nature intended them, viz. the propagation and increase of the species.

¹ In Lancashire, and some of the adjacent counties, public annual meetings are established and held for the encouragement of increasing the variety of gooseberries, and premiums are annually given to persons that produce the best new kinds. The acquisition of the many new and valuable kinds of this species of fruit, which have lately been obtained from seed, may, in a great measure, be attributed to this public incitement. The consequence is evident, that a similar establishment for the increasing the varieties of grapes, would, undoubtedly, be crowned with equal success. If such a plan as here proposed were established in various parts of the kingdom, and public notice given thereof, it would certainly excite the admirers of this elegant branch of gardening to exert themselves on the occasion. Let but the project be begun and tried, and, I am persuaded, that the success it would be crowned with, would soon make it a fashionable recreation.

The grapes for seed should be permitted to remain on the plant till they are perfectly ripe, as the seed is not till then quite matured, when it generally is of a very dark-brown colour. As soon as the seed is taken from the pulp, or flesh, of the grape, it should be laid on a sheet of paper, or the like, in some airy, but shady place, to dry, and then carefully preserved till spring. If, however, the seed were to be immediately sown, and the pots kept in the hot-house, and moderate waterings given them during the winter, the plants would rise and come up in the spring: but the great disadvantage attending this method is, that the plants would be liable to come forward too early, and, of course, come weak. For although the seed would lie dormant during the winter, notwithstanding the artificial warmth of the hot-house, yet as soon as the days began to increase, and the sun to regain his force, the genial warmth of his rays will soon, and, perhaps, too soon, bring them up. It will, therefore, I think, be the most eligible to sow the seeds about the end of February, or the beginning of March ^m.

^m The beginning of March seems to be the most proper season for sowing the seeds of plants in a hot-house. In the spring, it is customary to raise a succession of crops of kidney beans in most hot-houses, which are generally sown at intervals of 10 or 12 days, from the middle of December to the beginning of May. I have constantly observed a very distinguishable difference in every crop till the beginning of March; each crop coming better, and growing more robust and vigorous than the preceding one. But, after the vernal equinox, the case alters, and the crops then come more weak, the plants growing tall, slender, and long-jointed.

For this purpose, let small pots be filled with very light, rich, sandy mould ; into each pot put eight or ten seeds ; lay them at regular distances, and press them into the mould with your finger to the depth of half an inch ; then fill up the holes, and make the surface of the mould smooth and even.

The pots should be plunged either in the tan-bed in the hot-house, or in a temperate hot-bed, for a moderate warmth will, at that season of the year, soon cause the seed to vegetate. As soon as the plants appear, they will require, from time to time, gentle sprinklings of water ; but this must be given them very sparingly, especially during the

I take it for granted, that the health, strength, vigour, and longevity of a plant (perhaps, too, the same may be said of man) depends greatly on its good beginning. This remark may be deemed worthy the farmer's observation, as it will show the importance and necessity of fixing upon a proper seed-time.

As the sun's annual course is always the same, it necessarily follows, that the seasons of a hot-house, where the air is confined, must be nearly so too. But in the open air the case is very different, and we find, by experience, that there are many weeks difference in vegetation, according to the lateness or forwardness of the spring. Hence no fixed time can, with propriety, be ascertained for sowing the spring corn and grass seeds ; but nature's signs will be the farmer's surest guide. The leafing of trees, the state of the ground, and the weather, will, if well observed, afford the best directions to the farmer in this important business.

There are certain critical seasons in the spring, when all nature seems combined to promote vegetation ; when the very air is big with impregnation, and the earth swells, as wishing for the descending shower.

time of their having only seed-leaves ; once a week or ten days, if the weather be fine, will be quite sufficient during the time they remain in that state ; and should the weather prove either gloomy or rainy at that juncture, let the watering be entirely omitted.

When the plants have so far advanced as to have three or four joints a-piece, they must be carefully shaken out and planted each in a separate pot, filled with the same kind of mould as was before recommended.

The greatest care will be required in the performance of the above operation, as it will be beneficial to preserve as much of the roots as possible. When the plants again are placed in the tan, or the hot-bed, a gentle sprinkling of water should be given them ; and from thenceforward they may be treated exactly in the same manner as will be recommended hereafter for plants raised from cuttings.

I shall go on, therefore, to observe, that it would not be prudent to furnish a wall, or any part of a hot-house, with seedling Vines in their untried state, or before they have produced fruit. For although the prospect of obtaining good kinds from seed saved in a hot-house, be more promising and certain than that of getting them from seed of grapes in vine countries, (because there, when the Vines flower, the very air is impregnated with the *farina* of the grapes of the vineyard, which are, generally, of sorts only esteemed for making

wine; but, in a hot-house, the best eating grapes are only planted,) yet many of the new kinds from seed will prove to be worse sorts than the originals from which the seed was saved. A specimen, therefore, of the fruit should be obtained from each plant, be tried and tasted, before it is permitted to be planted against the walls, or preferred into the hot-house. Hence you see it will be proper to keep the plants until they are three or four years old, before you dispose of them either on the wall or in the hot-house; and then, if they be managed as will be hereafter directed, they will produce the fruit you like and approve, and with the greatest certainty.

Having dispatched this new method of raising the Vine from seed, I shall next beg leave to suggest a few hints on the subject of the customary method of propagating this plant, and shall afterwards endeavour to lay down a new and improved method of raising vine-plants by cuttings.

The general method of propagating the Vine is, either by layers or cuttings. The Vine is a free-striking plant, therefore young plants may be obtained each way without much difficulty.

When the Vine is intended to be propagated by a layer, a shoot that will easily bend to the ground is generally chosen for the purpose. After making the ground light and fine with the spade, the shoot should be fastened by a small hooked stick at about six inches below its surface. If a little light fresh soil, with a mixture of pond mud, were well

closed about the bottom of the layer, it will facilitate its striking.

The ground should be well closed to the layer; the surface should be made smooth, and formed into a kind of basin, after which a little very rotten dung must be laid therein in the manner of mulching.

The layer will strike freely, either with or without an incision being made at the bottom; early spring, before the rising of the sap, is the most eligible season for the performance of this business, because the shoot would be liable to bleed at the wounded part, as soon as the sap begins to rise.

During summer, if the weather prove dry, frequent waterings should be given, for it is absolutely necessary to keep the ground in a moist state during that period. The new plant will acquire sufficient roots in the course of the summer, to admit of its being taken off from the mother plant in the autumn, and this should be done as soon as the leaf has fallen. Great care must be taken to preserve the roots of the new plant uninjured through the succeeding winter, therefore it will be proper to keep the plant, during that season, in a guarded situation, where it may be well secured and protected from frost, as its future success, in a great measure, depends on the preservation of its first fibres or roots.

Vines are sometimes laid in pots with great advantage. The most eligible method of performing the operation is by conducting the shoot through

the hole at the bottom of the pot, and by making an incision about six inches below the surface.

When a layer is taken from a strong fruitful branch, and laid in a large pot, filled with proper compost, which must be done with great care and caution, it will sometimes come immediately into bearing. Indeed, this is the principal advantage that accrues from this mode of practice; for vine-plants, raised by layers, are much inferior to plants raised by cuttings, both in point of future vigour and durability.

The usual method of propagating the Vine by cuttings, has been in more general practice than that of raising plants by layers; the cuttings are formed of the lower part of the shoot, consisting of a few joints of the wood of the last year's growth, together with the knot, and a small part of the two years' old wood. It has been an observation of ancient date, that a vine-cutting, when formed complete, has the appearance of a little mallet.

The proper length of the cutting, is a point that has not hitherto been perfectly settled and determined.

Miller, whose directions have been pretty much followed, allows it to be about sixteen inches; others have prescribed shorter dimensions; but all agree that it should consist of several joints at least of the last year's wood.

A cutting of this sort will strike freely, either with or without an artificial heat; a temperate hot-bed heat will, however, not only facilitate its

striking with greater freedom and vigour, but will also greatly accelerate the growth of the plant.

There seems to be a great superfluity of wood in a cutting of the above description; for when it is deep planted, the lower eyes in general decay; and, if planted shallow, the part above ground commonly dies down to the eye, even with or immediately under the surface.

In this place it will not be improper to observe, that various other plants, as well as the Vine, admit of being propagated by layers and cuttings, and that it is allowed that cuttings are generally preferable to layers, and that plants, raised from small cuttings, commonly make the best plants. The cause seems obvious, viz. that it appears injurious to the new plant, in proportion as it partakes too abundantly of its original or the mother plant. Hence it is evident, that the less the matter that forms the rudiment of the new plant, the better. Indeed this theory is evinced by practice; for it is well known, that those plants raised from seed, which have the smallest beginning, always make better plants, and are greatly preferable to those of the same species, which are raised either by cuttings or layers.

It may be unnecessary here to go through the common process of raising vine-plants by cuttings of the foregoing description, as I propose to offer a more advantageous method of propagating the Vine from only a single eye, and about three

inches and a half of the last year's wood ⁿ. Plants raised by this method, as I have happily

ⁿ This mode of propagating the Vine from a single eye first occurred to my very worthy and learned friend the Rev. Mr. Mitchell, who has been so obliging as to transmit to me the following curious and important account of the success of this method :

“ Sir,

“ I have received two letters from you since I wrote last ; the former not requiring any immediate answer, I postponed writing till I could give you a short account of the success of some Vines that were planted cuttings in our way, the end of December, 1775, and beginning of January, 1776, so that they have had only one year's growth before this spring. One of them, which came to us for the white Sweetwater, but of which I have some doubts whether it may not turn out the white Muscadine, has now no less than sixteen bunches upon it, and I might say seventeen, if I would reckon every thing. The Vine comes out very strong and vigorous, and seems able to ripen them all. The uppermost bud has brought out four bunches, the second four bunches, and the third three bunches ; and the lowest bunch upon each of these is a full bunch ; nor do any of them seem weaker than one might have expected upon a Vine of several years old. Another Vine, which is the Syrian, and was a cutting planted in the bark the 9th of January, 1776, has two bunches upon it ; one only upon a branch ; the bigger of these has its stalk at about half an inch or an inch from the branch, as thick as a moderate goose-quill, so that it seems to be providing for a large bunch ; but it is not expanded far enough yet to form an exact judgment of it, unless to a person who had seen more of it than I have ; for I expect it will be a fortnight yet at least before it blossoms. The method of planting cuttings in the tan, with a single eye to them, is our own ; I have never seen nor heard of its being used by any body else, except those to whom my brother and

experienced, are greatly preferable to those raised by cuttings in the common way, as they have more

self have recommended it: it may, however, not improbably have occurred to others who may have practised it, as well as ourselves. What first suggested it to us to try it, was, that we found cuttings, with two or three eyes to them, planted in the common way, which was the way we first raised them in pots of earth, and plunged into the tan, one eye being left above the earth, were not only troublesome from their great length, but that the eye above ground either dried up entirely, or shot weakly at best, and also often died away again afterwards, whilst the buds that were covered with earth got up and thrived much better. This seemed to say, let the bud intended to grow be covered. We also observed, that few or no roots shot from any part but the farthest or lowest extremity of the cutting, so that all the intermediate parts seemed to be of little or no use, provided the roots would shoot equally well from the extremity, when shortened to one eye only; and to be satisfied that the joint, immediately below the eye, is desirous of throwing out roots for the use of that eye, one need only look at the roots which are thrown out in several parts of the Vines that are growing vigorously in a hot-house, which, very manifestly, I think, show that they belong to the eye, or branch proceeding from the eye, immediately next above them. All these together made us think it very likely that the method we now use would succeed, and we had already got into the way of planting the cuttings in the tan first, rather than in pots of earth, from the beginning, finding, by experience, as well as learning from others, that most things would begin to strike much more readily, as well as more certainly and kindly in that manner, than the other. The cumbersomeness of a cutting of fifteen or eighteen inches long, that no pot almost will contain, was a thing one would wish to get rid of. The experiment was easy to try, and no loss if it did not succeed; we therefore made the experiment, and in three or four years,

abundant roots, grow shorter jointed, are more prolific, and will, if permitted, come into bearing the second year.

that we have used the method, have found no reason to think that Vines can any way be raised more easily or sooner, or that the Vines raised this way are, in any respect, less vigorous or less perfect, either when younger, or as old as we have yet had time to see them, than those raised in any other way; nor do I think that old wood in the cuttings is either necessary or useful, a hot-house summer, upon plants (that by being planted in the bark, begin to grow a month sooner than the other hot-house Vines, or even more, if you please) being fully sufficient abundantly to ripen their wood, if not even almost to over-ripen it. And that you might have the means of judging a little better of the merit of this method, I have given you the account, in the beginning of this letter, of two Vines planted in that manner, which, however, I hope to have the pleasure of showing you some time this year, with the fruit upon them, when you will have a better opportunity of satisfying yourself about it. As to your proposal of planting the cuttings single in pots with sifted tan, I have no doubt but it will do very well; but I doubt whether quite so well as in the bark without pots; for besides that I think the pots prevent the heat, &c. from being quite so kindly, there may so many more cuttings be planted in the bark; and if they are four or five inches only asunder, and are not suffered to grow there too long before they are potted, there is no difficulty in shaking off the bark, so as not to hurt the roots, and they come sufficiently near together in point of time, their having shot a little, more or less, not being very material; for when they have once begun to shoot, and have got tolerable roots, they will then, as far as I have seen, grow very kindly in pots of earth, whether they are a little more or less advanced.

“Yours, &c.

“*Thornhill, April 3. 1777.*”

The causes being thus assigned for the preference given to plants raised by this method, and the advantages gained by this mode of practice thus specified, I shall now proceed to give directions at large on this subject.

The first care should be to make choice of proper and well-ripened wood to form the cuttings, as it is absurd to imagine that good plants can ever be produced from wood imperfectly ripened : indeed the case here is exactly similar, and may be considered in the same light, as between plants raised from well-perfected seed, and plants growing from seed not well matured.

Some persons are of opinion, that cuttings taken from the lower part of the Vine are preferable to those that grow higher, and at a distance from the root. But for my part, I confess I could never find any difference, so as to induce me to give the preference to either, provided the wood was equally well ripened. But it generally happens that the best wood is produced at the most distant parts from the root, and especially in Vines trained against rafters in the hot-house, where there is generally a very distinguishable difference between the top and the lower parts of the plants, in respect to goodness.

The new shoots constantly appear first at the most distant parts, and are generally more strong and vigorous, in proportion to their distance from the roots. I mention this particular, because forward shoots from Vines, forced early, are the most

eligible for the intended purpose. Early and forward shoots, having a longer summer than those afterwards produced, will, of course, be better ripened and matured.

Vines against common walls, or in vineries, that are not forced early, will sometimes produce remarkably strong wood, and such shoots, on account of their uncommon size, are, by unskilful persons, frequently chosen for cuttings.

The extraordinary size of the shoot I consider as one of the least requisites necessary to form a good cutting. Indeed exceeding strong shoots generally abound too much with pith to claim a preference. I wish to observe, too, that much good depends on the nature and form of the eye, or bud, as well as the wood, and that better buds are generally produced from shoots of a moderate size, than from exceeding strong ones.

The particulars necessary to form a good cutting are principally these: 1. The eye, or bud, should be large, prominent, and bold; 2. The shoots should be moderately strong, round, and short-jointed; 3. The texture of the wood should be close, solid, and compact; but the best criterion of its maturity is its solidity, and having very little pith.^o

^o The young vigorous shoots of many trees, as well as the Vine, greatly abound with pith. Among these the Elder seems to be the most remarkable. I have observed a pith in young vigorous shoots of this plant that has measured above five-eighths of an inch diameter; and here it may be deemed

At the pruning season, therefore, make choice of such shoots as come under the above descrip-

worthy of observation to remark, that the pith of such shoots decreases in proportion as the wood becomes more mature, and its place occupied and filled with new wood, which shows that wood grows internally as well as externally; a consideration from hence will enable us to solve a certain phænomenon in forest trees. It is observable that the under branches of the oak and other forest trees are constantly in a state of decay, and especially in neglected woods of large trees where they stand near together. And the custom has been in many places, though a very injudicious one, to cut off those dead branches even with the bole of the tree. But now suppose that a dead branch of three, four, or more inches diameter happens to stand inclining to a perpendicular direction, (which is frequently the case,) and this be cut off in the above manner, it generally proves extremely injurious, by causing a material defect: for the bark of the tree soon rises round the base of the stump, and thereby forms a kind of basin to receive the falling rain; and thus the remaining dead wood (for the lower part of the branch inclosed in the tree dies also to a considerable depth) is soon brought into a state of decay, which, by being infectious, becomes general, and often terminates in the almost entire destruction of the tree. Let us now conceive a branch of the above description left to nature, and observe the consequence. Her efforts, as in critical cases of the human body, will sometimes perform what the most eminent skill and nicest art cannot accomplish. The upper part of the branch soon decays, and naturally falls off first; one may then really conceive the remaining part to be as a peg or wooden pin, shapen exactly, and fitting and filling up the wounded part for the preservation of the tree. Here it should be understood, for the upper part of this imaginary pin to extend beyond the body of the tree, while its base below is grown over by the annual increase of the bole.

tion, cut them to any convenient length, and put them into pretty large pots filled with light sandy earth. Let the bottom of each shoot be cut with a sharp knife, perfectly smooth, as they will then

Now the *outside* of the extending part of the dead branch or imaginary pin being less mature than the heart or centre, by being exposed to the weather, it will, of course, decay first; and I have constantly observed it generally falls off in annual scales. As these scales shell off, the increasing new bark swells round the base of the stump, and occupies the space till it meets and unites in the centre. — As the new bark covers a considerable part of the dead wood, for, as has been observed, the lower part of the branch, inclosed in the tree, dies also to a considerable depth, for the decay will follow the grain of the wood. The important subject to be discussed is, whether it may not contribute either to the general decay in the bole of the tree, or cause a material blemish in the wood, when it comes to be converted into use. Now the remaining part of the stump being protected from the weather, and excluded from the air by the surrounding live wood, it may be considered, in a great measure, as similar to the pith of the tree, but with this difference, as having more body, and being of a firmer texture, consequently its decrease will not be so rapid; however, length of time will reduce it to a vegetable mould. This is evident, as these dead stumps are never found entire in the bodies of large, sound, unshaken trees, when converted into use. However, this vegetable mould being devoid either of sand or earthy particles, retains but little body in this state; and being compressed by the *internal growth*, as admitted above, of the surrounding live wood, it will at the last terminate in nothing more than a small black knot. I must beg leave to observe, that the dead branches of trees, of the resinous kind, do not come under the above description, for the dead branches of trees, of this class, are preserved by a turpentine matter quite entire, and in their original magnitude. This is evinced

receive the moisture from the mould better than when the wound is rough. They should not stand too deep in the pot, as the eye below the surface of the mould might receive a material injury during the course of the winter, and thereby be rendered unfit for the intended purpose.

Ten or twelve cuttings may be put into each pot, but they must not stand too near together, as in that case they would be liable to grow mouldy.

When various kinds are intended to be propagated, each sort should be kept in a separate pot, with a label affixed to denote the species.

During the winter, keep the pots in a sheltered situation, and by all means let them be protected from the severity of the season. However, in fine mild weather, though it be in the winter-time, the cuttings will be benefitted by being permitted to stand awhile in the open air. This exposure will swell, and give a boldness to the bud, and also keep the wood fresh, and continue its vigour; but great care, nevertheless, must be taken to carry the pots into shelter on the least approach of frost.

The principal care required during the winter-season is, to keep the mould in a proper degree of

by the knots we constantly observe in deal timber. As the preservation of timber is an object of so much importance, I am willing to hope that it will be deemed unnecessary to apologize for this digressional note.

moisture, in order to give the cuttings as much free air as possible ; but at the same time to protect them from frost. The putting the cuttings in pots, and this management of them, is only intended to keep them as fresh as possible till the planting season.

As the cuttings require a hot-bed, and the beginning of March being the proper season for planting them, dung should be previously provided for the purpose. I will not take up the reader's time in going through the common process in the preparation of the dung, and the making of the hot-bed, these operations being generally understood by almost every gardener ; let it therefore suffice to say, that the bed should be, in all respects, adjusted as if intended for melons, and proportioned in its dimensions to the quantity of plants designed to be raised.

In about three weeks after the bed has been made, and its furious fermentation has subsided, take off the frame, and let the bed be well trodden and made smooth ; and in such manner that the surface may have an easy declivity to the south. Then replace the frame, and cover the bed about six inches deep with very fine light sandy earth, in which the pots are to be plunged. Tan would answer this purpose, but I prefer a light sandy soil, because (a constant steam naturally rising from the hot-bed) the steam that proceeds from soil is more agreeable and wholesome to the cuttings, than the stench that evaporates from tan.

Watch-sticks should be thrust down into different parts of the bed to ascertain its heat ; and then, as soon as the heat becomes moderate, fill a number of the smallest sized pots, (viz. $\frac{4}{8}$ inches diameter, and $3\frac{3}{8}$ deep, inside measure,) in proportion to the number of plants you wish to raise, with very fine light sandy mould. Plunge the pots quite up to their brims into the mould in the frame, and then shut down the glasses till the mould in the pots becomes warm, which done, prepare and plant the cuttings in the following manner.

Now as I have already shown the properties which constitute a good cutting, I shall here describe the manual operation required in the formation of it.

Let the upper part of the shoot be cut sloping with a sharp knife, about a quarter of an inch above the eye ; and at about three inches below the eye, cut off the wood horizontally. Great care, however, should be taken to leave the wood smooth at the bottom ; the upper part, too, should be taken off with a clean stroke. As each joint affords one good cutting, a few shoots of about one foot long will afford you great choice.

The cutting being ready, make a hole with the finger, or by thrusting a small dibble down between the mould and the side of the pot, into which let the cutting be carefully inserted, and so placed, that the eye may admit of being covered about a quarter of an inch deep, with the fine rich mould above described.

It is very observable that a cutting strikes with greater freedom against the side of the pot than in the middle of it ; for the pot being porous, imbibes the moisture, and thereby prevents the cutting from being overcharged with it, which is not the case when a cutting is planted in the middle of the pot.

I always plant the cutting on the north side of the pot, putting a label to denote the species on the opposite side ; and whenever the plant is shifted into a larger-sized pot, or removed to a different situation, I constantly observe the same rule. Thus the plant being raised from a single eye, it rises as it were from seed, and the foregoing rule being observed, it will always stand with the same side towards the sun ; and by being planted on that side of the pot which stands to the north, it will admit of being kept in the same position when planted out for good ; whereas it should be considered, that were it to be planted on the opposite side, (*viz.* that which stands next the south) the plant must either be reversed in its position when planted out for good, or there would remain the entire breadth of the ball of earth in the pot between the wall and the stem of the plant. Plants, in general, but particularly those kept in hot-houses, or that are intended to be planted against walls, are benefitted more by a strict observance of this method than is commonly imagined. The shoots, leaves, and even the bloom-buds of plants, all form themselves in the most advantageous position to

receive as much of the sun's influence as possible.

The sun is the primary cause, the very life and soul of vegetation ; and by a certain kind of natural magnetism, plants, in general, have almost as great a propensity to tend to that glorious luminary, as all the various bodies surrounding the earth have, by their gravity, a tendency to its centre.

In the spring, after a dark season, when the sun chances to break forth in a serene evening, it is pleasing to observe small seedling plants, of all kinds, bending with their little faces towards the sun, as if straining and desirous to partake, as much as possible, of his divine influence.

From hence it is not difficult to conceive the reason why, on this side of the equator, our plants in general, (I speak of those in the open air,) should have a certain inclination to the south, and even so as to render their forms (particularly trees) crooked. But it must be considered, that in the summer, when vegetation is in its full career, the sun's rays fall daily almost on every side of plants. Besides the above cause, plants growing in the open air are also greatly agitated by the wind, which, by its variableness, constantly moves them to and from every side ; and it is from these two causes in conjunction, that plants grow erect and branch out, as we see they do almost equally on every side.

But now plants in the hot-house have a far greater propensity to incline to the south than

plants growing in an exposure, because they are not only sheltered from the wind, but are also deprived of light from the north, by the construction of the building.

As soon as the cuttings are planted, give them a very gentle watering, and then put on the glasses. A gentle moderate bottom heat is all that is required, and therefore great attention should be had respecting the heat of the bed. A brisk, lively heat, that might agree with many other plants, would be too powerful for the Vine. For the first ten or fifteen days after planting, a great deal of air should be admitted, in the day-time especially, if the weather be clear; and even, should the weather prove mild, a little will be required at night also: it will be prudent, however, to cover the glasses with mats for fear of frost. Should the glasses be kept too close, the buds will rise with too much rapidity; that is, before any roots are formed. I have seen shoots one inch high in the course of a few days; but shoots of such a quick progress are very liable to be destroyed by a strong sun; and, therefore, in clear weather, it will be advisable to shade the plants in the middle of the day; and at these times a less quantity of air should be admitted.

Give the plants a gentle sprinkling of water every four or five days in fine weather; but should it prove dark and moist, once in eight or ten days will be sufficient. Observe always to water in an evening, just when the sun is going off the plants,

and let the glasses be shut down close in the nights after watering : this will cause a moisture to be raised in the bed, which the plants will imbibe to their great benefit.

As the plants increase in size, constant waterings should be given, and a greater quantity of air admitted in proportion to their progress : by the time they get to be six or eight inches high, they will require to be shifted into pots of a larger size. Great care, however, should be taken in the performance of this operation, neither to injure the top nor roots of the plant.

The plant should be turned out of the pot with the roots and ball entire, and the pot should be sufficiently large to admit of a proper quantity of fresh earth on this shifting. I generally put the plants into pots of seven inches diameter, by six deep (inside measure). If the heat of the bed begins to abate, it should be renewed with a little fresh stable-yard dung, and the frames should be raised to a proper height, in proportion to the progress of the plants.

In replacing the plants in the bed, regard should be had to setting them in the same position they were in before, for the reason already given.

Small sticks should be provided to support the shoots when they are grown to the length of ten or twelve inches. Pinch off the wires or tendrils, and also the lateral shoots, as fast as they are produced. Keep the pots clean from weeds, and give the plants frequent and gentle waterings ;

but this must be adjusted according to the state of the atmosphere, since, in moist weather, the humidity of the air, in a great measure, answers the purpose of watering. Give plenty of air at all times, but especially in a fine day, when, if there be not much wind, the glasses should be entirely taken off. If the glasses be kept too close, the want of a sufficiency of free air will cause the plants to grow tall and long-jointed ; and it is for the same reason, that the plants ought not to make too rapid a progress in the fore part of the summer, it being far more desirable that they should grow robust and strong, which they are more likely to do with a gentle, bottom heat, and when a sufficient quantity of free air is admitted.

If the weather should prove favourable at the end of May or beginning of June, the plants will require as much free air as possible ; and, therefore, the covering should be entirely omitted, except when there may be an appearance of frost at night ; and even then, the glasses should not be shut down close.

Should any of the plants appear weak and unpromising at this season, viz. about the middle of June, I generally cut them down to the lowermost eye ; and then they will, by the assistance of a hot-bed, strike freely and rapidly, and produce strong, straight, and vigorous shoots ; and, by proper care and attention, the wood may be brought to a tolerable degree of perfection even after this season.

In places where a hot-house, or Vine-wall and border have been previously provided, and are in readiness for the plants, it would be advisable to plant the Vines out for good, about the end of June, or beginning of July, as they will make a good progress after this season in the same year. But in new works, it is almost impossible to get the building and border ready to receive the plants the first summer, as the border will require a competent time to be worked over, to meliorate, and to settle; therefore my directions will, principally, relate to such plants as are kept in pots through the first winter. I the more strongly recommend this mode of practice on another account, which is, that as so much depends on the preservation of the first roots, the plants can be better preserved in pots, which may be set in a green-house, &c. in the winter, than when planted in the open ground, where they will be exposed to the severity of the weather.

In the months of July and August the young plants will require very little artificial heat. I have sometimes placed them against a common wall during those months, and have found the plants succeed very well. They will, however, by the assistance of a bottom heat, grow faster; and by being kept in a hot-house, they will make a still greater progress. I have sometimes had plants which have made shoots upwards of twenty feet long in the first summer. But when plants are intended to be kept in pots through the winter, a moderate-sized plant is preferable; because in

large plants (and such as are kept many years in pots) their roots will be too much bound together and matted. A plant, with a shoot of about five or six feet in length, moderately strong, and perfectly well ripened, is quite sufficient.

I generally stop the plants (by pinching off their tops) at that length; for, if intended for a vinery, they will require to be cut down within a few inches of the ground; and, if for taking through the front wall, and training in such hot-house as is here recommended, about three feet is a sufficient length. But when plants are wanted for any purpose where a longer stem is required, they must be trained accordingly. In all cases, however, it should be remembered, that four or five eyes at the top of the shoot generally break out into laterals, and thereby render that part of the wood useless; so that a proportionable allowance should be made in consideration of this defect.

The pots should be constantly kept clean from weeds, and, during the hot months, very frequent waterings should be given to the plants. In very hot dry weather, they will require a little water twice a day. I constantly cover the surface of the mould in the pots with a little rotten cow's dung. This mulching prevents the mould in the pots from drying too fast, and also contributes to invigorate the plants.

When Vine-plants have been trained up, either against a common wall, reed-hedge, &c. (where they will succeed very well during the hot months,

especially in a sheltered situation, and particularly with the assistance of a bottom-heat,) it will be proper to bring them into a hot-house about the beginning of September ; because, if permitted to stand in the open air, they generally lose their leaves on the first autumnal frost ; and after this the wood cannot attain to a proper degree of maturation ; whereas, in the hot-house, they will constantly retain their leaves till the beginning of December ; and, when this is the case, the wood will generally be in the highest degree of perfection.

About the middle of December the plants should be pruned down to the proper lengths required ; if intended to take through the front wall of an hot-house, three feet and a half is a sufficient length ; but if intended to plant in a Vinery, they should be cut down to eight or nine inches.

Towards the latter end of December it will be necessary to remove the plants into a green-house, glass-case frame, &c. ; in which cool situation they must remain till the middle or towards the latter end of February ; when, if the season proves tolerably favourable, they should be planted out for good.

During the time the plants stand in this cool situation, they should be watered very sparingly ; a little water given every ten or twelve days, just to keep the mould in the pots moderately moist, will be quite sufficient. Give plenty of air in mild weather, and especially towards the latter part of the time ; for if the plants are kept too close and warm,

they will be liable to shoot too early, in which case they should be planted directly, that is, as soon as the eyes appear in motion, for the plants would be greatly injured by being retarded in their progress after this period.

I will now suppose the hot-house to have been built the preceding summer, and the border previously prepared, according to the foregoing directions; in which case, if the weather will permit, the Vines should be planted about the latter end of February, or beginning of March, in the front of the hot-house, in the following manner. As the eyes of the Vine-plants are liable to be injured by being taken through the holes of the front wall, some method should be adopted by way of prevention. I generally put a little moss round the upper part of the stem of the plant, and over this wrap two or three thick folds of paper, which I tie round with the strands of bass matting.

Opposite to each rafter, and close to the front wall, make holes of about two feet diameter, and one foot deep; let the mould taken out of the holes be made fine; and if a little fine compost mould, of a very rich quality, be added thereto, it will facilitate the growth of the plant. Turn the Vine-plant very carefully out of the pot, and put the upper part of the stem through one of the holes of the front wall. If the shoot will just reach the bottom of the rafter, when planted, it will be sufficient. But as the mould put into the hole, and the border itself too, may yet settle a little, an allowance of two

or three inches should be made for the settling of the plant also.

Observe to set the plant with its proper side to the sun; then, while one person holds the ball in the exact place in which it is designed to stand, let another put mould carefully under and round every side thereof. In closing the mould to the ball, care should be taken to preserve the roots of the plant. The extreme points of the fibres being exceedingly brittle, are very subject to be injured, unless great care be taken in the performance of this operation. Raise the mould about one inch above the top of the ball, and form the surface into a kind of semicircular bason, in which it will be expedient to lay a thin mulching of rotten dung, and to give a gentle watering to settle the whole. Then take off the moss, paper, &c. and let the top of the shoot be carefully fastened to the rafter. Thus the business is completed.

To direct the very identical kinds of Vines to be planted, may, perhaps, be deemed an act of officiousness, since every one, who is at the expence of an hot-house, has an undoubted right to consult his own palate; and more especially as I have, in a former part of this work, pointed out the kinds most proper for training in a pine-stove. I shall, however, just beg leave to observe, that the more vigorous-growing kinds ought not to stand next each other; and that, if the different species of black, white, blue, grizzly, red, and amber, were judiciously mixed, they would have a much

better effect in regard to beauty and appearance, than when two or more of the same colour are planted together. ^p

The Vines, in general, will begin to shoot immediately after they are brought into the hot-house: only one shoot should be permitted to remain on each plant; but for fear of an accident, (for young shoots easily break off from the old wood,) it will be advisable to let two remain, till they are grown to a sufficient length to be fastened to the rafters. When one shoot is secure, the other may be taken off, but not close to the old wood, as it would occasion it to bleed, and thereby greatly injure the Vine.

From the time the Vines begin to grow, they will require constant waterings, especially in dry weather, and more particularly in the beginning of the season, before the roots penetrate deep into the border.

Let a shoot be trained up to each rafter: when the rafter is of a competent depth, and bevelled off nearly to an angular point on the under-side, the shoot should be fastened thereto; but when

^p Mr. Carter, in his "Journey from Gibraltar to Malaga," gives the following superb account: — "This hill is so full of verdure, that the village, as well as the roads about it, are, in a literal sense, covered, shaded, and crowned with all manner of fruit-trees of a prodigious size; to whose topmost branches the luxuriant Vine mounts vigorously, and hangs in over-grown clusters, numberless bunches of red, black, and green grapes, which frequently intermixed with the Golden-apple, the Pomegranate, and the Orange, expose a most enchanting picture to the charmed eye." P. 7.

the rafters are not of a sufficient depth to keep the leaves of the Vine from touching the glass, the best expedient is, to fix iron pins of about nine inches in length, at proper distances under each rafter. There should be a small hole, or eye, at the bottom of these pins, through which a small iron rod or strong wire should be fixed, for the support of the branch. The pins and wires should be painted as soon as the work is finished, as the moisture, which arises in the hot-house, would instantly cause them to rust and decay.

It is not unusual for Vine-plants, raised in the manner here directed, to shew fruit at one year old. I have often had plants that have borne many bunches at that age, and have sometimes permitted three or four of them to remain on the plant, and they have been brought to a tolerable degree of perfection; and that, too, even when the plant has grown in a pot not more than one foot diameter. But when Vines are planted with an intent to furnish the roof of an hot-house, they should not be allowed to produce fruit the first season, as it would tend to debilitate the plant, and prevent its progress in growth: however, when a person is desirous of proving the kinds, one bunch, with the berries well thinned, may be suffered to remain, without much injury to the plant.

During the summer, if the Vines meet with no impediment or disaster, they will make a good progress. Observe, however, to water their roots constantly; and, as their shoots make advances,

keep them regularly fastened to the rafters: divest them also of their wires, and also of their laterals whenever they appear; but, above all, guard well against insects, particularly the *Acarus*, or red Spider: the rapid, though insensible depredations sometimes committed by these minute intruders, are really astonishing. But I shall have occasion to speak more fully on this head in another place.

The Vines may be permitted to run two-thirds of the length of the rafters, or, in general, about twenty or twenty-five feet, before they are stopped; and those that grow remarkably strong, may be suffered to run the whole length of the rafters, or about thirty feet.

When the Vines were planted in the large hot-house at Welbeck, in 1779, I permitted, by way of curiosity, a remarkably vigorous-growing plant, of the white Muscat of Alexandria, to make a random progress after it had got to the top of the rafter. It was trained sideways along the top of the stove. It continued to grow till late in the month of November, when, on taking the measurement of the shoot, I found it forty-six feet seven inches^a in

^a The following account of the surprising progress of some Vines last summer, at Kelmarsh, in Northamptonshire, addressed to me by William Hanbury, Esq. will, I trust, prove highly acceptable to my readers:

“ Agreeably to your request, I herewith transmit you an account of the progress of the Vines I had from you in November, 1786. The surprising shoots they have made in one season have astonished every one who has seen them.

length. In December it was pruned down to twenty-two feet, (or about thirty-five eyes,) and the

“ You sent them in balls of earth. The plants were small, the shoots not thicker than a goose quill, and raised, as you said, from single eyes the preceding spring. They were immediately put into pots about ten inches diameter. Their future management was nearly as follows :

“ The pots were put into the hot-house, and the plants were cut down to the lowermost eye in each. The soil is a fresh sandy loam, mixed with about one-third of rotten stable-yard dung.

“ The Vines were constantly kept in a moist state ; and, from November to March, were watered with rain-water only ; but from March to June we often watered them with soap suds.

“ During the time the Vines were in the hot-house, they were kept perfectly clean and free from insects : only one shoot was permitted to grow from each plant.

“ The last week in June the Vines were taken carefully out of the pots, and planted in a border on the south side of the hot-house, with their balls entire. The shoots were conveyed through holes in the front wall, and trained upwards against the rafters which support the roof of the hot-house.

“ I should have observed, that the border is composed of the same materials as has been described for the pots, its depth five feet, and its breadth fourteen feet : also, that the Vine-shoots were, in length, at the time when planted, from ten to fourteen feet.

“ During summer, the border was kept in a moist state, by watering it sometimes with rain-water, and sometimes with soap suds.

“ Many of the Vines showed fruit ; but, according to your directions, they were divested of all the bunches except one, which was permitted to remain on a Vine, which you called the white Muscat of Alexandria. This bunch was cut on the 26th

next summer produced two or three bunches at almost every eye. I did not, however, permit more than ten bunches to remain, which, in general, were brought to a great degree of perfection, but not any way superior to those produced on strong plants, that had been stopped the preceding summer at twenty or twenty-five feet.

After the Vine-shoots are stopped, (which is done by pinching off their tops,) they will, in general, push out laterals at three or four eyes on the upper part of the shoot. These laterals should not be entirely taken off, as it would cause more eyes lower upon the shoot to push also. It would, therefore, be prudent to permit the first laterals to grow twelve or fourteen inches, and then to pinch off their tops. These laterals, in their turn, will push out secondary laterals, which should be pinched off at the second or third joint: thus the sap may be diverted till the end of the season.

of November last, and weighed three pounds, wanting only two ounces. The berries were in general very large, and of an excellent flavour.

“ The Vines are, at this time, remarkably strong; and, in consideration of their different characters and qualities, I may say have grown with an almost equal degree of vigour.

“ I have measured the length and girth of each Vine-shoot, (there being thirteen in number,) and find them, in length, from thirty-one to forty-eight feet, and in girth, from one inch and a half to two inches.

“ I am, &c.

“ *Kelmarsh, Dec. 14. 1787.*”

In November, and the beginning of December, the leaves of the Vines change from green to beautiful variegated colours, and soon after fall off.

The time when the leaves of the Vine begin to fall, is the best season for pruning. In the hot-house, this will generally be in the month of December. In the first season of pruning, supposing the Vines to have grown with an exactly equal degree of vigour, it will be proper to prune the shoots at every other rafter down to three, four, or five eyes, and the other to about twenty-one or twenty-two feet. Here I wish to be understood, that the above mode of pruning is only to be used when Vines have grown remarkably strong the preceding summer; for when Vines have grown only moderately strong, the shoots should be pruned down to about half the above length, viz. eleven feet.

The intent in this alternate difference in pruning is, that, the former should make fine wood for the succeeding season, and that the latter should produce a crop of fruit, (after which, these fruit-bearing shoots must all be cut down nearly to the bottom of the rafters); but when any of the Vine-plants appear weak, and have not made shoots more than eight, ten, or twelve feet long, it will be proper to prune every such shoot down to two, three, or four eyes, without having regard to the aforesaid direction of furnishing every other rafter with a fruit-bearing shoot.

In pruning, observe to take off the shoots with a clean sloping stroke, about half an inch above the eye. Make choice of a bold eye to terminate the end of the shoot. After pruning, let the Vine-shoots be completely fastened to the rafters, &c. and thus ends the business for the first season after planting.

Vines growing in pine-stoves constantly begin to shoot early in the month of January: at that season they generally make weak shoots, and show small bunches; and this proceeds from the house being kept warm at that season, on account of the early crops of cucumbers, kidney-beans, &c. which are raised in most hot-houses. But when a hot-house is kept to a proper degree of heat required for pines, during the winter months, the Vines will seldom begin to push till about the middle of February. It is usual to see Vines in pine-stoves push only at two or three eyes at the extremity of the shoots. These two or three new shoots taking the lead, the rest of the eyes below will remain in a dormant state, and cause a long space of naked wood. In order to make the eyes push more generally, it will be proper, as soon as the sap appears in motion, to keep the house, for a short time, a few degrees warmer than usual, viz. in the morning the thermometer should be five or six degrees above temperate, and in the daytime the house should be kept as warm as the weather will permit: it will also be necessary to guard that part of the stem of each Vine, which is on the

outside of the house, against the approach of frost, as one severe night would greatly injure, if not totally destroy, the hopes of the crop.

As soon as the sap rises, its motion is exceedingly rapid; and, if part of the stem be exposed to the external air, a severe frost would entirely stop its circulation. The young shoots and leaves instantly contract, and, during the frost, appear in a shrivelled state; to prevent which, let the part exposed be well guarded by wrapping it round with moss, fastened by strands of bass matting, to a competent thickness. This covering should be permitted to remain till the spring frosts are entirely over; and, when this covering is taken off, let the stem of the plant be made clean by well washing.

When Vines break out freely, they will push at almost every eye, from the top to the bottom of the shoots, nearly at the same time, and the shoots in general will show two or three bunches each. It will be proper, however, to divest the Vines of their supernumerary shoots, as soon as can be done with propriety, as it will greatly contribute to invigorate the remaining shoots.

It is very easy to distinguish which will make the most promising shoots, even as soon as the eyes begin to break; and by the time the shoots begin to be three or four inches long, the bunches are very distinguishable. In some kinds, the rudiment of the bunches stands so prominent as to be very visible, even at the breaking of the eye.

The leaves of the young shoots generally stand single at the first, second, third, and, in some kinds, at the fourth and fifth joints, and afterwards form in pairs, either with bunches or tendrils. And what is very remarkable, and differs from the ordinary course of nature in other sorts of fruit, is, that the bunch is produced from the side of the shoot opposite to the leaf, and comes out from the naked part thereof, being neither connected with the leaf, nor the eye, nor the rudiment of either. The bunches appear at the third, fourth, fifth, and sixth joints: from the sixth forward, the leaves form in pairs with the tendrils. When Vines have been very vigorous, and exceedingly prolific, I have sometimes seen bunches at the seventh, eighth, and once at the ninth joint; but an instance of this last is very rare.

When Vines show bunches plentifully, it often induces the person intrusted with their management to leave too abundant a crop; but this temptation should be withstood, as a few bunches in a high state of perfection, are preferable to numbers in a less: besides, the future success of the Vines depends much on a judicious management in this particular: therefore, in case the shoots, which are pruned to about twenty-two feet, should show two or three bunches at almost every eye, which they will frequently do, not more than nine or ten of the young shoots should be permitted to stand, viz. the leading or top shoot, and four or five on each side; and the shoots that remain should be

divested of all but one bunch on each, which should be the bunch which is best proportioned and most regularly formed. The shoots should be left at regular distances, that is, about four or five feet apart on each side: observe, also, to let one shoot as near the bottom as it can be got. These shoots should be trained regularly on each side of the rafter, and the top of each shoot should be pinched off as soon as it is grown to a sufficient length, and begin to interfere with the adjoining shoots above; or, in general, let the shoots be stopped at the second or third joint above the bunch.

Great attention will be required during the time the Vines are in flower. Should the weather prove hot and dry, and accompanied with brisk winds at that critical period, the berries of many kinds of grapes (particularly the blue Frontinac, white Sweetwater, and black Damascus) will be liable to fall off at the time of their setting, and the berries that remain will, in general, be very small, and without stones. This proceeds from the calyx adhering to, and drying upon, the germen or rudiment of the berry, and thereby preventing its impregnation. Therefore, in order to have the crop set permanent, it will be proper at this period to water the roots of the vine plentifully, to keep the house as close as the weather will permit, and to water the walks and flues in the hot-house constantly, and especially late in the evening, when the glasses should be immediately closed. The heat of the hot-house will exhale the moisture,

and raise a kind of artificial dew, which, by falling upon the calyx, will cause it to expand and fall off. By this means, the important parts of fructification are set at liberty to perform the offices for which nature intended them, viz. the increase and propagation of their species. After a kind impregnation the berries always swell very fast.

It is not unusual to see bunches of the white Sweetwater, and some other kinds of grapes, greatly abound with small berries, (which are without stones,) which proceeds from the above recited cause, and may be prevented by an assiduous attention to the foregoing rules.

Although grapes set best in a close moist air, yet the hot-house should not be violently hot during the time of their setting.

When the weather is serene, and all circumstances concur agreeably, transparent drops of dew will be observable in a morning on the angular points of the Vine leaves.

This is the most favourable indication which can happen at the critical season of the Vine's flowering; for I have constantly observed the grapes to set well, and the growth of the berries to have been extremely rapid, when the Vines have been in this state.

Pull off the superfluous shoots which may break out in various parts of the old wood during the summer, and divest the young shoots of all their laterals likewise, whenever they appear. This may be done without reserve, or having the least

regard to the preservation of the wood ; because every Vine-shoot that was left more than twenty feet long at the last year's pruning, with intent to produce a crop of fruit, must be cut down nearly to the bottom at the next winter's pruning.

But all the rest of the Vines, that were cut down at the last year's pruning, I will suppose one at every other rafter, must be trained with one shoot each, exactly the same in every respect as in the preceding season.

When grapes are at the last swelling^r, and till they are nearly on the point of being ripe, the Vines will require a plentiful supply of water, and especially if the season should prove hot and dry. Few plants perspire so abundantly as the Vine, and more particularly when it is under glasses. The situation of Vines, trained in pine-stoves, may be considered exactly in a similar state with Vines growing in very hot climates. Near the tropics, for instance, we are told that at the Madeiras they do not attempt to plant vineyards, even where both soil and situation are the most desirable, without a command of water^s, the Vines there re-

^r The last swelling of grapes commences at the time they begin to be transparent. At this period, the *red*, *black*, &c. grapes begin to change from green to red, black, &c. respectively.

^s “ The great produce of Madeira is the wine, from which it has required fame and support. Where the soil, exposure, and *supply of water* will admit of it, the Vine is cultivated. The inclosures of the vineyards consist of walls, and hedges of prickly pear, pomegranates, myrtles, brambles, and wild roses.

requiring a constant supply of that element, and especially at the time they are loaded with fruit.

Walks of about five or six feet wide intersect each vineyard, and are included by stone walls two feet high. Along these walks, which are arched over with laths about seven feet high, they erect wooden pillars at regular distances, to support a lattice-work of bamboos, (a sort of cane) which slopes down from both sides of the walk, till it is only a foot and a half, or two feet high, in which elevation it extends over the whole vineyard. The Vines are, in this manner, supported from the ground, and the people have room to root out the weeds which spring up between them. In the season of the vintage they creep under this lattice-work, cut off the grapes, and put them into baskets: some bunches of these grapes I saw, which weighed six pounds and upwards. This method of keeping the ground clean and *moist*, and ripening the grapes in the shade, contributes to give the Madeira wines that excellent flavour and body for which they are remarkable.

“ *The water* is conducted by weirs and channels into the vineyards, where each proprietor has the use of it for a certain time; some being allowed to keep a constant supply of it, some to use it thrice, others twice, and others only once a week. As the heat of the climate renders this supply of water to the vineyards absolutely necessary, it is not without great expence that a new vineyard can be planted; for the maintenance of which, the owners must purchase water at a high price.”

Forster's Account of Cook's Voyage, vol. i. page 23.

A frequent supply of water is not only profitable to the Vine, but also equally beneficial to other kinds of fruit-trees growing in warm climates, as is evinced by the following extract from Sir William Hamilton's elegant account of the late earthquakes in Italy, communicated to the Royal Society in the year 1783.

“ From this place* to Reggio the road on each side is

* *Torre del Pezzolo.*

If the foregoing directions have been strictly attended to, the bunches of grapes will, in general,

covered with *villas* and orange-groves. I saw not one house levelled to the ground; but perceived that all had been damaged and were abandoned; and that the inhabitants were universally retired to barracks in these beautiful groves of orange, mulberry, and fig-trees, of which there are many in the environs of Reggio. One that I visited, and which is reckoned the richest in all this part of *Magna Grecia*, is about a mile and a half from the town of Reggio; and, what is remarkable, belongs to a gentleman whose name is Agamemnon. The beauty of the Argrume (the general name of all kind of orange, lemon, cedrate, and bergamot trees) is not to be described; the soil being sandy, the exposition warm, and *command of water*, a clear rivulet being introduced at pleasure in little channels to the foot of each tree, is the reason of the wonderful luxuriancy of these trees." To which I shall only add, that every body knows the vast use of canals in the cultivation of fruit-trees, in the land of Egypt, at this day. "Don Agamemnon assured me it was a bad year when he did not gather from his garden (which is of no great extent) 170,000 lemons, 200,000 oranges, (which I found as excellent as those of Malta) and bergamots enough to produce 200 quarts of the essence from their rinds. There is another singularity in these gardens, as I was assured, every fig-tree affords two crops of fruit annually; the first in June, the second in August.

"Silk, and essence of bergamot, oranges, lemons, are the great articles of trade at Reggio. I am assured that no less than 100,000 quarts of this essence is annually exported. This fruit, after the rind is taken off, is given to the cows and oxen; and the inhabitants of this town assure me, that the beef, at that season, has a strong and disagreeable flavour of bergamot."

I shall beg leave to make two observations on the foregoing accounts:

be large and fair, with well-swelled and high-flavoured berries.

After the fruit is cut, the Vines will require no other management till the pruning season, but taking off their laterals, in the manner already pointed out for the preceding year. †

First, I presume that water is not admitted either into the orchards or vineyards during the winter, as a wet soil would prove highly injurious to those kinds of fruit-trees at that season. It is, on this account, I have directed drains for the purpose of taking off the superfluous water at the bottom of the Vine-border.

And, secondly, as too much water at the time of the ripening the fruit would debase its flavour, I conclude that if Sir William Hamilton and Mr. Foster had made enquiry, they would have been informed by the respective inhabitants, that the waterings are less frequent at the time of gathering the fruit, and the season of the vintage, than at an earlier period.

Since the foregoing notes were written, I have met with the following curious account, which shows the necessity and great importance of a plentiful supply of water in vineyards, &c. in warm climates.

“Water is the great agent, the *primum mobile* of all productions in this country; every thing languishes, and soon is parched up, without an ample supply of it; abundance of rain secures both a plentiful harvest and a copious vintage.

“Whenever a spring breaks out, the King’s people seize upon it, and allot to each landlord a proper hour for letting the water upon his grounds. It is of so much consequence, that the value of a guinea has been paid for an hour extraordinary.”

Swinburne’s Travels through Spain, page 113.

† As it frequently becomes necessary to convey ripe grapes to a remote distance, and as this delicate fruit is very liable to receive injury by improper methods of packing, I hope the fol-

At the next winter's pruning, all the Vines that produced a full crop of fruit should be cut down

lowing information on this subject may be of use to many of my readers.

When grapes are intended to be conveyed by water, they may safely be packed in boxes with sand. First, put a quantity of sand sufficient to cover the bottom of the box about one inch; upon this lay your bunches in a course, or layer, almost close together, only take care that none of the berries touch the sides of the box. Upon this layer of bunches pour in dry sand, till the grapes are covered about half an inch; then lay in more grapes and sand alternately, till the box is filled.

Grapes, thus packed, will travel safe, and by being almost excluded from the air, will keep fresh and good a long time. Grapes are constantly thus brought into this country from *Portugal*, and they often arrive in pretty good perfection. But now, considering the expence from weight in this mode of packing, it would be extravagant to use it when this fruit requires to be sent a considerable distance by land carriage.

Grapes will also travel with great safety, by being packed in a box with any small bright seed. Clover seed is very proper for this purpose; but the expence attending this mode of conveyance is also very considerable, both on account of the great value of the seed, and also in respect of its weight. I would therefore recommend the packing grapes in oat-chaff, as the most eligible in all respects.

Grapes have sometimes been packed in tow, wool, cotton, and paper shavings; but I find, by experience, that oat-chaff is greatly preferable. Oat-chaff is not only exceedingly light in its nature, but is also possessed of a kind of elastic force.

Please to observe, that when oat-chaff is used, it ought not to have any disagreeable smell; it should also be cleansed of all impure matter; and the grapes should be perfectly dry at the time of packing, and the bunches well examined, that if

nearly to the bottom ; that is, to the lowermost summer shoot, which shoot also should be cut down to the first or second eye.

But all those Vines that were cut down nearly to the bottom the preceding season, and which will, in general, have made very strong wood, must

there be any berries either decayed, cracked, or bruised, they may be clipped off the bunch. — Then carefully tie each bunch in a bag made of silver or gauze-paper, its size being proportioned to that of the bunch.

In packing, proceed thus : First put a good quantity of chaff into the box, then carefully lay your grapes in a kind of course or layer ; a small quantity of chaff should be lightly pressed between each bunch, as also between the bunches and the sides of the box. — Then add more chaff, press it lightly, and lay in a second course, or layer of bunches. Grapes, however, packed in this manner, ought not to be more than two courses deep, because the bottom bunches would be liable to be injured by the weight above,

I must observe, that the course of chaff between the layers of the bunches, and likewise at the top and the bottom, ought, when it is well pressed down, to occupy a space of about two or three inches.

I have for many years thus sent grapes from Welbeck to London, (a distance of about 150 miles,) and when the boxes have been put either in the inside, or upon the body of the coach, the grapes have generally gone without injury, and even preserved their bloom : nor do they require dipping in water, which is a necessary operation when grapes are sent in sand. However, I must say, that when boxes go in the coach-boot, (where the motion is more violent,) the fruit will commonly spoil ; for which reason, I have boxes made exactly to suit the seats of the stage-coaches.

be left to the length of twenty-one or twenty-two feet each, with intent to produce a full crop of fruit the following season.

The management of the Vines the next summer will, in many instances, be nearly the same as in the preceding one. Only let it be considered, that as the Vines have increased in strength and size, they will, consequently, be enabled to produce and support a larger burden of fruit.

The crop should at all times be proportioned to the size and vigour of the tree, and that in every stage; but especially while the Vines are young, it will be advisable to use great moderation as to the number of bunches which are to be allowed to go on to maturity.

The shoots may now be laid rather closer together than in the preceding season, and two bunches may be permitted to remain upon such shoots as are strong and vigorous; and especially of those kinds that do not produce large bunches. It will be proper, however, that the berries of the bunches, in general, should be well thinned.^u This work is best performed at the time when the berries are about the size of small shot. Great address is required in the performance of this operation; and

^u In order to thin grapes with propriety, a proper pair of scissors should be provided. The blades should be made with exceeding sharp points, and not more than one inch and a half long. The shanks about four inches long, and quite straight; the eyes sufficiently large to contain a man's thumb and two fingers.

particularly when the bunches are extremely large. The first thing to be done is, to extend both the main shoulders, as also the less projecting parts of the bunch, which parts should be suspended by small strings, and fastened to the rafters, or glass-case frames above. Every projecting part of the bunch should be raised to an horizontal position ; and, when the berries are fully swelled, they will retain that position even after the strings are cut.

In thinning of the berries, great care should be taken to leave all the most projecting ones on every side of the bunch ; since by this means the dimensions of the bunch will not be diminished.

In those kinds of grapes that produce very close growing bunches, it will be necessary to clip out more than two-thirds of the berries ; but in some kinds, one half ; and in the loose-growing kinds, with long foot-stalks, the taking out one-third is generally sufficient.

By this mode of thinning, the remaining berries will, in general, swell well, and grow to a very great size ; and will not be subject to rot, as is generally the case with grapes in a hot-house, when the berries are permitted to grow close, and to become wedged together.

In training the shoots of the Vines, I have hitherto taken notice only of furnishing the rafters, or roof, of the hot-house ; but there is yet another important object that demands our consideration, which is, a further advantage that may be

gained by furnishing the back wall. In such hot-house, as the subjoined plan represents, there is a space of nine feet clear above the flue in the back wall; the length of the said wall being (nearly) one hundred feet, there is, of course, a space containing almost nine hundred square feet; and certainly there is no part of a hot-house that can be rendered useful, which should remain unoccupied. A space, therefore, so considerable as the above, undoubtedly merits our attention.

Now, in order to furnish the back wall; let every fourth or fifth Vine-plant be trained in one shoot quite to the top of the rafter; then direct the shoot sideway, ten or twelve feet, along the top of the back wall. At the winter's pruning, bring down that part of the shoot perpendicularly, which, in the preceding season, was trained sideway, and cut it off at one foot above the top of the flue. The next spring, encourage only two shoots from the two extreme or lowermost eyes of each shoot so brought down, and train them in an horizontal direction one foot above the top of the flue. These shoots will, however, grow with greater readiness, if they be trained upwards during the summer; and in such case they may easily be brought to the desired position at the next winter's pruning. When the pruning is finished, and the shoots brought down and fastened in their proper position, they will form against the back wall the following figure, **I**, viz. the figure of the letter **T** reversed.

In the next season, the horizontal shoots will produce new wood from almost every eye, provided all the shoots be pinched off from every other part of these plants as soon as they appear. Lay in the young wood at proper distances; that is, the shoots from one to two feet apart, according to the kind of Vine to be trained, whether it produces small or large leaves. But of this I shall have occasion to treat more particularly hereafter.

The shoots must all be trained in a perpendicular direction; and provided they are strong and vigorous, may be permitted to grow to the length of five or six feet before they are stopped; but these shoots must all be cut down to two or three eyes at the next winter's pruning.

Only one shoot should be permitted to rise from each spur the following season; and although they will, in general, be sufficiently strong, and produce two or three bunches a-piece, yet only one bunch should be suffered to remain upon each shoot: the remaining bunches will then be large and fine, and the wood also will be greatly benefited by this mode of practice.

These shoots must be pruned next winter very differently from the preceding. One shoot must be left four feet, that next it only a few inches long, and so on alternately, throughout the whole length of the wall. The reason for this alternate difference in pruning, and for the continuation of the future management of the Vines growing against the back wall, will be given, when I come to treat

of Vines trained in the Vinery, the method of practice in both situations being nearly similar.

I shall now return to the consideration of the management of those Vines which are intended to be trained against the rafters, or roof, of the house.

These Vines will require a management, in future seasons, nearly similar to that already described ; and although it will not be advisable to prune every other Vine-plant down so near to the bottom of the rafters, as has been directed for the two preceding seasons, yet it will be frequently found necessary to cut an old shoot down nearly to the bottom ; that is, down to the lowermost summer-shoot, as near to the bottom of the rafter as can be. And the side-shoots of the Vines on the remaining rafters should not be permitted to ramble over the adjoining lights ; but at the end of every season it will be proper to cut such shoots down to the second or third eye next the old wood, provided the bottom eyes are bold and strong. This must be done, not only in order to strengthen the Vines, but also to prevent the roof of the house from being too much crowded with old wood.

And here it is necessary to observe, that, while the Vines are young, one rafter will afford sufficient room for a Vine-plant ; but when the Vines are become older, they will require a larger space ; and more especially Vines of the strong growing kinds, which produce large leaves and large bunches : it will be proper, therefore, to train shoots sideways

on the wall plate, from the stem of the plant, immediately at its entrance into the house. These shoots should be carried up the adjoining rafters, and the plants, growing against such rafters, must be taken entirely away ; except it should happen that the plant growing against such rafter is trained forward to furnish the back wall.

In the large hot-house at Welbeck, Vines are trained in the manner here described. Some of the plants occupy two, three, and four rafters each. A large Vine of the Syrian grape furnishes five rafters, and each branch, being engrafted with a different sort, the plant of course produces as many varieties.

When a Vine-plant occupies two or more rafters, it will be right to prune occasionally, and particularly while the Vine is young, one or more of such Vine-shoots down nearly to the bottom of the rafter. This will not only contribute to strengthen the plant, but will also afford means to furnish the rafters with a succession of young wood.

When Vine-shoots are conducted to different rafters, in the manner above described, every shoot may be considered as a separate plant ; and, whether grafted or otherwise, must be trained up the rafter in one shoot ; and from that time it will require a similar management to that already laid down.

Having given full instructions for the preparation of the soil, and described the various methods

of propagating the Vine, together with rules for its future management in the hot-house, I shall, in the next place, endeavour to give proper directions for the erection of a *Vinery*; and afterwards shall subjoin a few hints and observations respecting the culture and management of the Vine, when planted in different departments.

ON
THE VINERY.

BOOK II.

THERE are various methods of constructing Vineries. Every large and commodious building, appropriated solely to the purpose of producing grapes, is generally termed a Vinery, while those erections, of less dimensions, are called Grape or Vine frames.

I shall first treat of the most useful form.

Flued walls of about twelve or fourteen feet high, in a direction from east to west, with a roof and glass lights covering a border of about ten feet wide on the south side of the wall, compose a proper receptacle for the production of grapes, or a Vinery.

It is usual to have upright glasses, of about two and a half or three feet high in front, to support the roof; and this is very proper when Vines are intended to be forced at an early season, because it admits the sun and light to the border, which is generally occupied with various kinds of low-growing vegetables; but where grapes are not wanted at an early season, a considerable expence

may be saved, as, in that case, a low wall in front will answer equally as well. The shade of this wall would be very injurious to the border, if the Vines were to be forced early in the spring; but the meridian altitude of the sun, in the beginning of summer, renders it noway prejudicial at that season.

Supposing a flued wall, twelve feet high, the breadth of the border ten feet, and the height of the upright glass frame, or wall, in front, three feet, the roof will then form an angle of about forty-three degrees. Experience shows this to be a proper pitch for Vines forced after the vernal equinox. I mention this circumstance, because some persons, who give designs for buildings of this kind, lay so great a stress on this point, as to pronounce a Vinery, or Peach-house, incapable of answering the intended purpose, should the pitch of the roof happen only to vary a degree or two from their favourite angle. Indeed, if we suppose the sun's meridian altitude always the same, such an objection would rest on a solid foundation; but we know that it not only varies daily, but many degrees in a short space of time^a; so that if the pitch of the roof depended on so nice a point, what might be deemed right in the early part of the spring, would certainly be wrong later in the summer.

^a At London, latitude 51. 30. N. in the summer solstice, (June 22.) the meridian altitude, or sun's place above the horizon at noon-day, is $63\frac{1}{2}$ degrees. But at the winter's solstice, (December 22.) it is only $16\frac{1}{2}$ degrees above the horizon.

In Holland, it is customary to begin to force Vines in November, in order to have ripe grapes early in the spring. In these frames, used for winter forcing, it is found necessary, that the glass frames should be in an almost perpendicular direction. The Dutch have also a method of forcing Vines planted in the open ground, the shoots of which are trained in an horizontal position, about eighteen inches from the ground. Over the Vines, which are forced in the summer, they put frames nearly as flat as those commonly made use of for melons.

Hence it follows, that the construction of the different frames, or buildings, for the purpose of producing grapes, should not only vary according to the quantity required, but also according to the season in which that fruit is intended to be produced. — The roof should be steep for early forcing, and flatter for the summer.

As I have given a plan and explanation of a Vinery, which has constantly succeeded in producing good crops of grapes for more than twenty years, it may seem unnecessary to say more upon this head; for the satisfaction, however, of those who wish to proceed on a less extensive and more economical scale, I shall suggest a few more hints upon this subject in another place.

The construction of the building being determined, the next objects which demand our consideration are the compost proper for the border,

and the method of raising Vine-plants to furnish the wall.

But then, as I have, in the former part of this work, explained myself fully on both these heads, a repetition of them here would be altogether needless and superfluous.

We will then suppose both the wall and border to be complete, and plants wherewith to furnish them ready.

Vine-plants raised in pots will sometimes make a good progress the first summer, when planted out for good about the month of June: but it is hardly possible to get the border in proper order for planting the same summer that the wall is built, because the ingredients of which it is composed require much time, and a winter's frost is of great use in causing them to incorporate, meliorate, and settle. The same care will, therefore, be required in preserving the plants through the winter, as has already been recommended for those intended for the hot-house. And so at the pruning season, the Vine-plants intended for the walls should have been previously pruned down to nine or ten inches, as has been already directed.

The beginning of March is a fit season for planting the Vines: but the choice of proper kinds, which has been already treated of, and the distance at which they should be planted, ought previously to be ascertained.

It should seem that sufficient attention had not hitherto been given to the latter of these heads of

consideration, because we find it is the common practice to plant all the different sorts at the same distances; whereas the different degrees of vigour, and manner of growing of the different sorts, require larger or less space to be allowed, in proportion to the natural character and qualities of the plant.

It happens but too often, that the space allowed to Vines is too scanty and insufficient, as we seldom see the distance between plant and plant greater than three or four feet. Now it is certain that a wall will soon get furnished by this close method of planting, and that tolerable crops of grapes may also be produced in a few years; but if Vine-plants be permitted to remain many years so close together, they will be cramped in their growth for want of room, and thereby rendered less productive.

Suppose a wall twelve feet high, and the Vines planted even five feet apart, there will then, upon an average, be only sixty square feet for each plant; and yet we know that it is possible for a Vine to occupy more than twenty times that space.

I should recommend a space of from six to twelve feet between plant and plant, according to the sorts of Vines intended to be planted, that is, about six feet for the weak and delicate-growing kinds, and twelve feet for those that grow robust and strong. If these various sorts were judiciously mixed at the planting, about nine feet may be allowed upon an average.

The Vines thus planted, are intended in due time, entirely to cover the wall; but as it is very desirable to obtain a crop of grapes as soon as possible, it will be eligible and expedient to plant other Vines between for immediate bearing. But now as these of the intermediate plantation must be trained very differently from the former, I shall, for distinction sake, call them *temporary* plants, and the others *principals*. One temporary plant should be placed in the middle of every space between the principals. Plants that have been two or three years in pots, and that will come into immediate bearing, are most proper for this purpose. They must all be planted with the same care as has already been recommended for Vines in the hot-house, and arranged close to a trellis fixed in the wall, and to which their shoots are to be trained.

In planting the principals, it will be proper to set the plants so, that the two uppermost eyes in each may stand fair for the shoots going to the right and left: the necessity of this caution will be clearly explained, when I come to treat on the method of training.

Hitherto I have only taken notice of planting the flued wall, but it will be necessary to observe, that a few plants may be set against the front wall also, in order to their being trained up the rafters. These may either be planted within or on the outside of the Vinery, as the front wall should stand upon arches, to afford the roots of all the Vines an opportunity of extending their fibres to

a border on the outside. If planted on the outside, the Vine-shoots must be taken through small holes made for that purpose under each rafter. Great care, however, should be had respecting the future management of these, to prevent their injuring the Vines of the flued wall ; but of this I shall have occasion to speak more fully elsewhere.

As soon as the Vines are planted, the border should be pricked over about three or four inches deep, and made smooth : then the glasses should be put on, as it is of consequence that the Vines should shoot off with vigour. Gentle fires should be made in an evening, plenty of air given in the day-time, and especially when the weather is fine and clear.

The Vines will immediately begin to grow : the principals must be divested of all the shoots but the two uppermost, which are to be trained sideway to the right and left ; these shoots, however, are not to be brought down to an horizontal position till the next winter's pruning.

As the temporary plants are intended to occupy the upper part of the wall, while the principals are furnishing it below, let the shoots of those be trained upwards for that purpose.

The Vines planted in front must be trained with one shoot only from each plant, exactly the same as has been directed for the Vines in the hot-house.

If any of the Vines show fruit, the bunches should be pinched off as soon as they appear.

From the time the plants begin to grow, they will require a little water once or twice a week, according to the state of the weather.

As the shoots advance, they should be regularly fastened to the trellis and rafters: they should also be divested of their tendrils and laterals whenever they appear. It will be necessary to hoe and rake the border, in order to clear it from weeds and other noxious matter, every eight or ten days. For to keep the surface clean and constantly stirred, is of infinite advantage to the Vines, both on account of the sun's reflection, and as contributing to the greater purity of the air. If the border be permitted to grow foul, covered with weeds, moss, and the like, a moist and hurtful vapour will be generated, which will greatly retard the growth of the Vines.

There will be no necessity to continue the fires longer than the middle of April, unless the weather should be uncommonly severe. And in the month of May plenty of air should be given in the day-time; a little at night also, except there should be an appearance of frost:

In the beginning of June, supposing the spring frosts over, and the weather favourable, the glasses may be entirely taken off.

While the glasses are off, the border should be kept clean, and the Vines constantly watered, if the weather prove hot and dry. And moreover, as the shoots advance, they should be kept regularly fastened to the trellis.

If the foregoing directions be duly observed, the Vines may be reasonably expected to make a good progress the first summer. But as it is of great consequence to have the wood perfectly well ripened, and as it is very liable to be injured by early autumnal frosts, it will be advisable to put on the glasses in the beginning of September: should the weather prove mild and fine, this, however, may be deferred till the latter end of that month.

When the glasses are put on, let plenty of air be admitted both day and night, till the end of October, except the weather proves very severe; a little frost at night will not injure the plants. It is a material point that the leaves should be kept upon the Vines as late in the year as possible; for as long as the leaves are retained, the wood continues to receive benefit.

As soon as the leaves are fallen, it is a proper time to prune the Vines; but as the method of training Vines, which I am now going to enter upon, is quite new to the public, and because it pleases more, and makes a greater impression upon the mind, to see things represented than to read a description of them in words, I have given a plan, exhibiting the principals in six different stages. The temporary plants not requiring any particular mode of training, are purposely omitted in this sketch.

The shoots of the principals must all be cut down to two, three, or four eyes, making choice of the best and boldest eye to terminate the shoot. The

shoots should be brought down as near to an horizontal position, as can be without straining, and then tied to the trellis.

It is easy to conceive, that every principal will then form a figure resembling the letter T. See plate iii. fig. 1.

If the temporary plants should be large, and been trained in pots before planting, which I have already observed, they will, in general, have made good wood. The shoots of these may be pruned down to from six to fifteen inches each, according to the strength of the shoot, *i. e.* a weak shoot to six inches, if moderately strong to nine or ten inches, and if very vigorous, to fourteen or fifteen inches. When pruned, the shoots should be fastened to the trellis in regular order.

The plants against the rafters must all, without exception, be pruned down to the very bottom of each, that is, each shoot must be cut so low, as only just to admit of length sufficient for its being fastened to the bottom of the rafter.

It will be prudent to let the glasses remain on, a few days after pruning, and especially if the weather should be either severe or rainy. After the glasses are taken off, it will be necessary to lay a little mulching round the bottom of each plant, to prevent the frost from injuring the roots. It is necessary also to observe, that dung newly made, or too much decayed, is not so proper for this purpose, as dung that is in a dead state, and rather strawy. Dung from the outside of hot-beds made

in the spring, is, in general, very suitable for mulching. This should be laid to the distance of two feet every way from the stem of the plant, and to the thickness of three or four inches. A little very rotten dung may be thinly spread all over the border. This completes the business of the first season.

As the Vines will require the same management the succeeding year, a repetition of these directions will be unnecessary.

The principals must again be trained with two shoots only from each plant, and the Vines at the rafters with one shoot each, the same as in the preceding season. The temporary plants will probably show much fruit, but all the bunches should be pinched off as soon as they appear, because the Vines would require a different management, in order to ripen the grapes, which would hardly be worth the additional expense of fuel, &c. Besides, the Vines will not make near so great a progress, if the fruit should be permitted to remain.

If no unforeseen accident happens, the Vines will, in general, make extraordinary strong wood the second season, and the shoots may, in general, be suffered to grow almost to the top of the wall before they are stopped.

The second year's pruning must be performed very differently from that of the preceding one; the shoots of the principals must all be brought down to an horizontal position, and pruned in such

a manner as to leave a space of twelve or fourteen inches between plant and plant. See plate iii. fig. 2.

As the temporary plants are intended only to produce fruit for a certain period, namely, till the principals get sufficiently large to occupy the whole of the wall, they must be pruned for fruit accordingly. A strong shoot may be pruned to from fifteen to twenty eyes for bearing; between every two bearers, a shoot should be pruned down to two, three, or four eyes, in order to keep up a succession of bottom wood, till the principals furnish a full supply all along the bottom of the wall.

If all the Vines at the rafters have grown equally strong, it will be proper to prune every other plant down to three or four eyes, and the rest to from twenty to twenty-five eyes each, the latter operation being intended to produce fruit, and the former to make bearing wood against another year.

By the end of the second year after planting, the Vines will have extended their roots to almost every part of the border: and as at this tender age the roots are very liable to receive injury by severe frosts, I would advise the borders to be covered the thickness of three or four inches, with long dead strawy dung. Dung taken from the outsides of old hot-beds is exceedingly proper for this purpose. There is a kind of spirit in dung which produces warmth, and thereby prevents the frost from penetrating the ground, especially if the dung be laid to a considerable thickness.

This method of covering the border should be practised every winter, while the Vines are young ; but then the dung should constantly be removed from the border as soon as the winter frosts are over : a little of the very rotten dung may be permitted to remain, as this, with the addition of a little rotten cow-dung, should be worked into the border every spring.^b Great care, however, should

^b As it is very important to know what kind of manure is the most proper for Vines, and also the most eligible season of applying it, I trust the following extract will prove highly acceptable and satisfactory to my readers.

“ My landlord told me, that he had an intimate acquaintance, a Vigner on, at Verzenay, who was reckoned one of the most attentive and careful managers in all the country, and if I pleased, he would give me a letter to him, requesting him to give me all the information I desired.

“ This I readily accepted, and accordingly, when I arose in the morning, he had it ready for me. I proceeded to Verzenay, where I enquired for the Vigner on the landlord at Chalons had wrote to. I was presently shown his vineyard, with his house by the side of it. He read the letter, and received me with a certain air of hospitable pleasure.

“ We walked directly into his vineyard, which was dunging, in trenches dug for that purpose. This introduced a conversation on that point, in which he explained the modes and principles of dunging vineyards.

“ The season for dunging most approved here, is directly after the vintage, and to be finished before the winter sets in. It is all carried in on the heads of women and children in baskets. It is of consequence to have a dry season for the work of dunging, otherwise it is very badly performed. The women empty their baskets in trenches dug for that purpose, which are doing at the same time, and others spread it in the trenches, and cover it with mould immediately. These trenches vary ; some-

be taken not to injure the roots of the Vines ; and therefore, the border should not be worked deeper than two or three inches. This work is best performed with a three-pronged fork.

Although many good grapes may be obtained

times they are made along the centre of the intervals, at others they are dug between the plants, The sort of dung they prefer most is cow-dung, that is, the cleanings of the cow-houses, which are well littered with straw or stubble for that purpose : horse-dung is also used, but only on stiff soils. The cleanings of sheep-pens, littered, is much valued, and they think the litter of as much consequence as the dung. The peasants, vine-dressers, inhabitants of villages, and, in short, every body that keeps a single cow, takes care of the manure, forming it regularly into a heap for sale, and it is bought by the proprietors of the vineyards at so much a basket. They reckon that from five to eight hundred baskets are necessary for an acre of Vines. I saw the baskets, and reckon them to hold about half a bushel, so that eight hundred baskets are four hundred bushels, which I take to be about twelve or thirteen common farmers' cart-loads ; and this manuring is repeated every four or five years.

“ The price per basket varies according to the sort of dung and litter, but it generally comes to five or six shillings an hundred, delivered in the vineyards ; but if very good, to seven or eight, and sometimes more has been given. ”

“ Making dung is so much attended to throughout all the wine country, that every means are used to increase the quantity.

“ All cattle are kept in houses as much as possible, and littered straw is used for this ; also stubble, which is pulled up by hand ; rubbish-wood from forest-land, leaves of trees swept up, and fern from waste tracts ; every thing is applied to litter with the most unremitted attention. Much cattle are kept, especially cows. These are fed by every means that can

the third summer, and especially from the temporary plants, yet it will be prudent to have a regard to future wood, rather than to the crop.

It is an injudicious practice to endeavour to get an early crop from young Vines, as in that case it will be required to make fires early in the spring, which would prove very prejudicial to the Vines, by forcing them out at a season when much air cannot be given, for want of which the shoots would grow weak and long-jointed.

be taken. Every weed that is picked up in the vineyards, every blade of grass that arises, is saved with as much care as the grapes, and given to the cows.*

“Dung is, however, sometimes laid on in March, but it is not reckoned so proper for that work as Autumn. The quantity is the same at either season. Over-dunging they reckon prejudicial to Vines, causing them to run too much to wood, giving the wine a heaviness, and making it apt to grow mothery. But this depends on the soil; for some lands are so deficient in natural fertility, that, unless they are dunged more than commonly, they will not yield a crop: they lay a thousand baskets on such, and sometimes even so far as twelve hundred.

“I objected that this general spirit of dunging vineyards must rob all the common husbandry in the country; that, replied he, is of no consequence, for corn will not pay for dung where there are vineyards to demand it. Upon my doubting this, he seemed to lay it down as a maxim that could not be controverted.”

Marshall's Travels, vol. iv. p. 78.

* *The whole of this paragraph merits particular attention, and is truly worthy the farmer's unremitted imitation.*

The latter end of February, or beginning of March, is quite soon enough to begin to force. Moderate fires should be made for two or three days before the glasses are put on, as this will dry the wall, and prevent a strong steam from arising in the house. The border should be raked smooth; and if a little fine sand be thinly sprinkled thereon, it will contribute to the sun's reflection, to the wholesomeness of the air, and give a neatness to the house.

Plenty of air should be given whenever the weather will permit, and especially for the first ten or twelve days. This, with moderate fires, will cause the buds to break turgid, bold, and of a good colour. When a Vinery is kept warm and close at this critical season, the buds generally break pointed, weak, and of a yellowish hue.

Vines that have been exposed to the weather, generally break at almost every eye when forced at this season. The case is different with those that are kept constantly covered, as has been observed in treating upon Vines in a hot-house.

Many of the superfluous shoots should be rubbed off as soon as they appear, as this will contribute to invigorate the remaining shoots. And as soon as the bunches appear, it will be proper to go over the Vines, and carefully divest them of all but the necessary shoots.

The shoots should not be left on the principals nearer together than twelve, fifteen, or eighteen inches; a matter to be determined by the kinds, that is, whether they produce small or large leaves.

Much care and judgment is also required in the choice and disposition of these first rising branches, as the beauty and regularity of the Vines depend entirely on a judicious disposition in training their branches at first. The shoots from the principals must all be trained in a perpendicular direction ; and even supposing them very strong and vigorous, not more than one bunch should be permitted to remain upon each. These shoots may run five or six feet before they are stopped.

The temporary plants will, in general, shoot very strong, and show much fruit. Either three or five shoots may be left upon those branches that were pruned to fifteen or twenty eyes, that is, a leading shoot from the top, and one or two on each side, the latter should be stopped at the second, third, or fourth joints above the uppermost bunch, but the leading shoots should be suffered to run nearly to the top of the house. Only one shoot should be left upon those that are pruned down to three or four eyes, and this shoot must be stopped at the third or fourth joint above the bunch.

The shoots at the rafters, that were pruned to twenty or twenty-five eyes each, will probably push at all of them ; but not more than five or seven shoots should be permitted to remain, even on the strongest, viz. a leading shoot, and two or three on each side. Observe, one shoot upon each should be left as near to the bottom as can be, as the

whole plant will require to be pruned down to this shoot the next winter.

Only one shoot should be left upon those Vines that were pruned down to three or four eyes, (I suppose at every other rafter,) and this must be trained up the rafter as in the preceding year.

In spring, the weather is frequently very variable; and, therefore, it will be necessary that the gardener should pay strict attention to every part of the management of the Vinery himself; and particularly to the fires, admission of air, and watering of the border. If these be left to the care of labourers, the success will be very precarious, since it is from an attentive, proper, and judicious apportionment of heat, air, and moisture, that we must look for success.

Particular attention will be required when the Vines are in flower^c, as a small neglect at that

^c At the time of the Vines flowering in a Vinery, &c. the air is impregnated with effluvia of a very agreeable scent. This circumstance is noted in a passage in the *Canticles*, ii. 13. very remarkable and expressive. The words are, 'The Vines with the tender grape give a good smell.'

As even a very few bunches in flower are capable of affording a sensible and very pleasing odour, it seems somewhat extraordinary that Sir Thomas Brown should have thought differently in his comment on the above text.

"That the flowers of the Vine should be emphatically noted to give a pleasant smell, seems hard unto our Northern nostrils, which discover not such odours, and smell them not in full vineyards; whereas in hot regions, and more spread and digested flowers, a sweet savour may be allowed denotable from several human expressions, and the practice of the

critical season, would be attended with the most fatal consequence. If the weather should become hot and dry, the flowers of many kinds of grapes are liable to fall off: a cold, dark season also will sometimes produce the same bad effect. I may add too, that an extreme degree of fire-heat will prove equally prejudicial.

The air in the house should not, at any time, during the flowering season, exceed eighty-four or eighty-five degrees of Fahrenheit's thermometer; and, in a dark cold season, should be kept up to sixty-four or sixty-five degrees.

The surface of the border should be kept in a moist state, by being constantly sprinkled with water, for grapes set best in a close sultry moist heat.

As soon as the grapes are grown to the size of small shot, the bunches of the close-growing kinds should be thinned in the manner already described.

Pinch off the tendrils and laterals whenever they appear; divest the Vines of all superfluous shoots that may be produced during the summer, that so they may have nothing unnecessary to support. Keep the shoots, as they advance, regularly fastened to the trellis and rafters, and never suffer

ancients, in putting the dried flowers of the Vines into new wine, to give it a pure and flosculous race or spirit, which wine was therefore called 'Οινὸν θύρον, allowing unto every *Cadus* two pounds of dried flowers."

Sir Thomas Brown's Miscellaneous Tracts, page 25.

them to grow in a rude and disorderly manner. Vines managed in a masterly manner should always be kept in a neat state, and therefore will require almost daily attendance.

If at any time, during the months of June, July, and August, the weather prove very hot and sultry, hardly too much air can be given to the Vines. I have sometimes taken the glasses entirely off the Vines during a violent hot season, and have always found the grapes to swell exceedingly during such a constitution of the air. Besides, the Vines will be greatly benefited by this mode of treatment, and especially when there are copious dews and refreshing showers. It will be proper, however, to put on the glasses at the time of the ripening of the fruit, as there is no depending on the flavour of the grapes when exposed to the weather.

It is highly proper to keep the border in a moist state during the time of the swelling of the fruit; but when the grapes change, and become nearly ripe, water should be given very sparingly; since, if the border were at that time kept too wet, it would debase the flavour of the grapes.

As soon as the grapes are all cut, take off the glass frames, and give the border a very plentiful watering, which may be repeated two or three times in the space of eight or ten days, in case of dry weather. — From this time till the pruning season, the Vines will require a management similar to that of the preceding season.

In pruning the principals this third season, only

one general rule is to be observed, which is, to prune all the shoots produced from the horizontals down to three or four eyes each. See plate iii. fig. 3.

The shoots of the temporary plants must be pruned according to their strength and vigour; observing, however, to prune the lower shoots of each plant down to three or four eyes, in order to furnish a succession of bottom-wood. But the strong leading shoots may nevertheless be left to a pretty good length, viz. from eight or ten to sixteen or eighteen eyes, according to their strength; by this means the upper part of the wall will soon become completely furnished.

Those Vines at the rafters, that have born a crop, must all be pruned down to the lowermost summer shoot on each, which shoot should be shortened to four or five eyes; and the Vines between the bearers (*i. e.* at every other rafter) should be cut down to twenty or twenty-five eyes, or, in general to about two-thirds of the length of the rafters.

In the following, and all succeeding seasons, the Vines will require a management similar to that of the preceding one; therefore a repetition will be unnecessary.

As the Vines advance in age, they will certainly be enabled to produce every year, for a certain period, a larger crop of fruit: it is to be observed, however, that this must always be proportioned to the strength and vigour of the Vines.

By this mode of treating Vines, a large crop of fruit may be obtained every season. The Vinery at Welbeck has produced constant and large crops of grapes for the last twenty years, and the Vines at this time are exceedingly healthy and vigorous. The strength and vigour of Vines may be retained even for ages, where the forcing is carried on in a mild and moderate degree, just to assist nature and our seasons, so as to endeavour to bring the temperature of a Vinery as near as may be to the climate in which Vines succeed best in the natural way. Gentle and moderate forcing will always be found to answer this end best, and at the same time be attended with the least expense.

The principal thing now to be considered is, the method of pruning and training the Vines, and particularly the principals, till the wall gets fully covered in every part.

Training and pruning of the principals, the next or fourth season, must be the same as directed for Vines at the back wall in the hot-house; (see page 74. ;) viz. only one shoot trained from each spur, which shoots must be pruned to a long one and a short one alternately, as is there directed. See plate iii. fig. 4.

From every long shoot, *i. e.* those pruned to about four feet, five shoots should be trained the next or succeeding season, viz. two shoots on each side, and one leading shoot at top.

At the next or fifth winter's pruning, observe to cut the four side shoots down to two or three eyes

each, and the top shoot to six or seven eyes, or, in general, to about one and a half feet. See plate iii. fig. 5.

The shoots between the uprights must constantly be pruned down to two or three eyes each, in order to keep up a competent succession of the bottom-wood.

In the following or sixth season, the training and pruning must be nearly the same as in the preceding, with this only difference, that the uprights having advanced one and an half feet, every upright will admit of two side shoots more than in the former year, viz. three on each side. See plate iii. fig. 6.

When the Vines are arrived at this stage the wall will, in the next summer, be completely covered by the principals only; and, therefore, the temporary plants should by degrees be previously cut away to make room for them.

Here I wish not to be understood as affirming that the principals will always arrive at this state (viz. the sixth stage) at the sixth season after planting. — Vines are liable to impediments and obstructions from various causes; and so long as they make weak shoots in the summer, they must invariably be cut short down to two or three eyes at the next winter's pruning, without having regard to any of the stages, as has been set forth.

The future management of Vines, thus completely and regularly trained, will not be very difficult.

It is natural for Vines to produce shoots plentifully from the old wood; therefore when any of the side shoots of the uprights, or the bottom shoots between them, by their annual progress, rise too much from the old wood, they should be cut out at the next winter's pruning; and it will be further necessary to make a reserve of some new shoots to supply their places.

Also, when leading shoots of the uprights advance beyond due bonds, it will be expedient to cut all such shoots entirely away, down to the next side shoots below, which shoots should be trained upwards to form new leaders.

By this method of practice, a Vine-wall may be constantly kept in a regular and elegant form, without varying much above or below the true and proper standard.

In regard to the future management of the Vines at the rafters, it should be observed, that though it will not be absolutely necessary to adhere invariably to the rule laid down of annually cutting every other Vine down to the bottom of the rafters, yet it will be proper to keep these Vines from extending too far over the glass-frames, and thereby shading the house, which would tend to injure the Vines against the back wall. The method, therefore, of constantly cutting down some of them, and the training of one shoot from each, as has been already directed, will, of all others, be found to be the most eligible and successful practice.

It only remains for me to mention the early crops of choice fruits and vegetables, which may be obtained from the Vine-border. It is usual, in works of this sort, for gentlemen to promise much to themselves, by planting the border with standards, half standards, and dwarf-trees of various kinds of choice fruits, such as peaches, cherries, &c. ; together with crops of strawberries, peas, lettuce, &c. in abundance under them.

I confess the idea of this luxuriant profusion affords the mind a satisfaction truly pleasing. But those who pursue such modes of practice would do well to fortify their minds against future disappointments.

It should be considered, that the success of the Vines trained against the flued wall is the first and principal object. A few good grapes may be got from the Vines at the rafters, and without doing any material injury, provided the Vines are judiciously managed; but if the Vines at the rafters are permitted to extend themselves too far over the glass-frames, or if the border should be close planted with tall-growing fruit-trees, the Vines at the wall will, by this means, be deprived both of sun and light, and will be thereby soon reduced to an undesirable state of imperfection: besides, by such imprudences, the border, too, will soon be impoverished, so that disappointments will attend every future prospect.

It is certain, that the less the border is cropped with vegetables, &c. the better; and yet a few

articles may be procured in the spring, without much damage to the Vines. And in this case I would recommend, that the border should be furnished with plants growing in pots, such as strawberries, rose-trees, carnations, and various other sorts of choice flowers; nay, I should not much object to peach, fig-trees, &c. trained in pots. But even these should not be introduced in too great quantities, which would give the house an appearance of being crowded. To conclude this short business, by allowing a proper space to every plant, and by a strict observance of the foregoing rules, every thing will thrive; and the general result will be both satisfactory and advantageous.

FURTHER OBSERVATIONS .
ON THE
CULTURE
OF THE
VINE, ON VINERIES, VINE-FRAMES, &c.

IT has been already observed, that there are various modes of constructing buildings for the purpose of improving the culture of Vines.

Vineries, or Grape-houses, are sometimes built on commodious plans, of which the most elegant certainly are those which have an entire glass-framed roof, with one side descending to the east, the other to the west: the south end must consequently be glazed. As buildings of this construction are spacious, and will admit air to be given on every side, they are equally proper for forcing many kinds of fruits, as peaches, cherries, figs, &c. In such houses, however, the Vines should be trained to the rafters only, and the other fruits, as standards, dwarfs, &c. permitted to occupy the space below. But as these buildings admit the meridian sun only at the end of the house, they

are very improper for producing grapes at an early season.

Another kind of Grape-house is constructed on a plan similar to that of a single-pitted Pine-stove. In this, the flued wall should be about fifteen feet high; the roof should be slanting, and should cover an extent of about sixteen feet; and a flue should also run from the eastern to the western extremity, near the front wall of the house. These buildings are not only well calculated for grapes, but also for early crops of melons, strawberries, &c.

As glass is the principal article of expense in erecting proper buildings for forcing, glass-frames should be adapted, as much as possible, to answer different ends and purposes.

Where there are peach-houses, the glass-frames may be made useful in a double capacity, by having a building for Vines constructed of the same dimensions as those of the peach-house. For as peaches do not require to be covered with glass later than the middle of summer, a crop of grapes may be got by means of the same glasses after that season.

Melon-frames may also be applied to a double purpose; good crops of grapes may be obtained from Vines trained against dwarf walls, that is, walls about six feet high. Here a small slanting roof should be made of proper dimensions for the melon-frame glasses. In both the last-mentioned cases, a small degree of fire-heat would be of sin-

gular advantage, and might be applied either by a flued wall, the flue running through the house, or by cast-iron pipes, which are frequently used with success for this purpose.

I have already mentioned, that in Holland it is customary to begin forcing Vines as early as in the month of November.

The frames made use of for this winter-forcing are generally about twenty-five or thirty feet long, about five feet wide at bottom, and at the top about three feet. The height generally about ten feet, (the height of the Vine-wall to which the frame is affixed,) so that the glass-frames stand nearly in a perpendicular direction. The fire-place is at one end, the flue runs along the bottom to the opposite end, and generally returns to a chimney built in the middle of the frame.

The Vines are brought from the wall, and nailed all along the front, close to the glass-frames, and are securely covered at nights: by this disposition of the branches, it is easy to conceive that there must be difficulty in moving along on the inside.

I have seen grapes in these frames in pretty good perfection in the month of April, and was informed that they are frequently ripe in the beginning of March. The bunches, however, are not very plentiful in these early crops. The black and white Sweetwater are the kinds preferred for this early forcing.

As this kind of forcing in a manner spoils the Vines, it is necessary to have the Vine-walls at

least five times the length of the frame, in order to furnish a succession of well-perfected wood.

After the crop is over, the Vines, in the course of the ensuing winter, must be cut down nearly to the bottom, and they require a term of four or five years to recover themselves for another early crop.

The frame described would certainly admit of improvement, and flued walls would also be of further advantage, by co-operating with the flue on the inside of the frame. But still, this mode of forcing is by no means to be recommended in this country. On the Continent, the sky is, for the most part, clear. There is almost daily sunshine, and the weather is regular and settled during the winter season. There nothing is required but attention to guard against the severity of the frosts; but in a climate so subject to variation as ours, the same method of forcing can never be approved, because no means have yet been discovered to counteract the sad effects of the frequent cloudy dull days which we experience, and in which a strong fire-heat, such as would necessarily destroy all future hopes, must be applied. In short, vegetation cannot be carried on to any good purpose without the aid of the sun's heat; and, therefore, though in forcing, it be easy to guard against the severity of the nights, yet there is no security against long-continued dull days, but by a strong fire-heat, which, at such a season, would undo all.

The method of forcing Vines planted in the open ground, as has already been hinted, will, in this country, be far more advisable than the foregoing practice, and is more particularly suitable to those persons who are not possessed of any of the larger buildings above described.

For this purpose the Vines should be planted about three feet apart, and trained in an horizontal position about eighteen inches or two feet from the ground. Large melon-frames may in this case be used to produce a late crop of grapes, after the melon-season is over.

The bottom of the frame should be covered over with slate or tiles, to prevent the damp of the ground from rising, and to reflect the sun's rays, to the great furtherance of the grapes.

A lining of hot horse-dung, kept constantly round the outside of the frame, will also tend greatly to accelerate the ripening of the fruit.

The early kinds of grapes are the most proper for this method of forcing.

In countries where coal abounds, the Vines are sometimes forced by flued walls without any covering, but I have seldom seen good crops of grapes perfected this way; the berries on the bunches do not ripen equally: from the constant heat and reflection of the wall, the berries on the side of the bunch next it will ripen long before those in front, which will render the bunch unsightly, and hardly fit for the table at any season. Besides, both wall and border being at all times exposed to the

weather, the fruit will become insipid in a long wet season. It is further to be observed, that the berries of many sorts of grapes are very subject to crack in wet weather, after which they generally either soon decay, or become a prey to wasps and flies.

In some seasons there are many kinds of grapes which will ripen well against common walls, and particularly in the southern counties of this kingdom. But Vines against walls, without any covering, are liable to several misfortunes. The reflection of the wall constantly brings out the young shoots at an early period in the spring: they are frequently injured, and sometimes totally destroyed, by sharp frosty nights, not unusual in the beginning of May, and which sometimes happen even at the latter end of that month.

A cold summer retards the ripening of grapes exposed to the weather, and a wet autumn renders them insipid and of little value.

In order to save expense, oiled paper is sometimes used instead of glass; but Vines do not succeed well under such a covering, nor are the grapes so high flavoured as when under glass. By the faintness of the beams of light which such a covering affords, the Vines will grow weak and long-jointed, and especially in a dull moist season, when much air cannot be admitted.

When oiled paper covers are used, they should not be applied till the Vines begin to push in the natural way, and even should be used at first only

to defend the Vines from the cold of the nights, it will be necessary they should have free air in the day-time, to prevent their drawing weak.

The great damage done by oiled paper covers is, from the too close covering at the beginning of the season ; but when the Vines come into flower, they are not so liable to receive hurt by close covering, because the wood cannot draw weak after the leaves are grown to their natural size. The ripening of the grapes may be greatly accelerated by covering after this period, and more especially with the assistance of a little fire-heat, which may be applied as has been already directed, page 136.

FURTHER OBSERVATIONS

ON

PRUNING.

THE success of Vines depends so much on judicious pruning, that one can hardly be too explicit in giving directions upon this head.

Vines trained in the regular manner already directed are much easier kept in proper order than those trained in the usual way. But notwithstanding the full directions before given, I am inclined to drop some further hints on the subject, which I flatter myself will be found of use.

A common error in pruning Vines, and indeed with most kinds of fruit-trees when trained against walls, is the leaving too much wood. It is no uncommon thing to see the leaves on Vine-walls so much crowded as almost totally to exclude the sun : Vines trained up to the rafters in hot-houses, &c. are frequently in the same predicament. But when Vines are in health and vigour, the bearing wood, which is, in general, the shoots of the former year's produce, should not be crowded. The shoots require a space from ten or twelve

inches to two feet and a half. This, however, depends in a great measure on the kind of Vine, that is, whether it produces large or small leaves. Now, in order to form a better judgment in this matter, I shall here subjoin a list of the dimensions of the leaves of various kinds, as taken at different periods, from Vines growing in Welbeck garden.

LIST of VINES, showing the Size of the Leaves, and the Length of the Foot-Stalks of various Species, taken at Welbeck.

	Diameter of the Leaf.	Length of Foot-stalk.
1. White Muscat of Alexandria -	12 inches.	8½ inches.
2. Red Grape from Syracuse -	11 -	6
3. Le Cœur Grape, or Moroc- co Grape - - - - - }	9½ -	5½
4. Aleppo Grape - - - - -	12½ -	6
5. Black Damascus - - - - -	11 -	5½
6. Black Grape from Tripoli -	11 -	5
7. Golden Galician - - - - -	10½ -	5
8. Black Muscadel - - - - -	11 -	6
9. Red Muscadel - - - - -	10½ -	6
10. White Grape from Alcobaca -	11 -	5½
11. White Frontinac - - - - -	11 -	7
12. Grizzly Frontinac - - - - -	11 -	6½
13. Black Frontinac - - - - -	12 -	6½
14. Blue Frontinac - - - - -	6½ -	4
15. Red Frontinac - - - - -	10 -	6
16. White Sweetwater - - - - -	9 -	4
17. Black Sweetwater - - - - -	8 -	3½
18. Black Hamburgh - - - - -	13½ -	7
19. Red Hamburgh - - - - -	11 -	6
20. White Hamburgh - - - - -	12 -	6½

	Diameter of the Leaf.	Length of Foot-stalk.
21. Malvoise - - - - -	9 inches.	5 inches.
22. Genuine Tokay - - - - -	11 - -	6
23. Lombardy - - - - -	11½ - -	7
24. Smyrna Grape - - - - -	10 - -	6
25. Brick Grape - - - - -	6 - -	4
26. Black Spanish, or Alicante - -	10½ - -	5
27. White Muscadine, or Chasselas	11 - -	5½
28. Black Muscadine - - - - -	9 - -	5
29. Royal Muscadine, or D'arboyce	12½ - -	7
30. Malmsey Muscadine - - - - -	12 - -	6½
31. Claret Grape - - - - -	6 - -	4½
32. Syrian Grape - - - - -	17½ - -	6
33. Miller's Burgundy - - - - -	5½ - -	3½
34. Small Black Cluster - - - - -	5 - -	3
35. Large Black Cluster - - - - -	6 - -	4
36. White Morillon - - - - -	9 - -	5
37. Early Black July Grape - - -	6 - -	4
38. Cat's Grape - - - - -	5½ - -	3½
39. Black Raisin Grape - - - - -	10 - -	6
40. White Raisin Grape - - - - -	11 - -	6
41. Damson Grape - - - - -	10 - -	5½
42. Early White Grape from } Teneriffe - - - - - }	9 - -	5½
43. St. Peter's Grape - - - - -	10 - -	7
44. Black Grape from Palestine -	10 - -	6
45. White Parsley-leaved Grape, } or Ciotat - - - - - }	7½ - -	4
46. Black Lisbon - - - - -	11½ - -	6
47. Greek Grape - - - - -	6½ - -	3
48. White Corinth Grape - - - -	5½ - -	4
49. White Muscat (from Lunel) -	12 - -	8
50. Cornichon - - - - -	9½ - -	5
51. Orleans - - - - -	8 - -	4½
52. Transparent - - - - -	8 - -	4
53. Pearl Muscadine - - - - -	10 - -	5½
54. Amber Muscadine - - - - -	10½ - -	5

	Diameter of the Leaf.	Length of Foot-stalk.
55. Sheep's Tail (from Portugal)	- 10 inches.	5 inches.
56. Humorous (ditto) - - - -	11 - -	5½
57. Deagalues (ditto) - - - -	10 - -	5
58. Cracking Grape (ditto) - - -	9 - -	4½
59. Small Yellow Grape (ditto) -	7 - -	4
60. White Constantia (from the } Cape) - - - - - }	12 - -	7
61. Small White Grape (from } Naples) - - - - - }	6 - -	5
62. Black Switzerland - - - -	11 - -	6
63. Maiden Grape - - - -	7 - -	3½
64. King's brown Grape - - - -	8 - -	4½
65. Passe Musque - - - -	12 - -	7
66. Jefferies Muscat - - - -	12 - -	6
67. Champaign - - - -	10½ - -	5
68. Large Purple Grape (from } Portugal) - - - - - }	11 - -	6
69. Peruvian Eye (ditto) - - -	12 - -	6
70. De do de Dama, or Ladies' } finger (ditto) - - - }	11 - -	5½

N. B. The above dimensions were taken, upon an average, from leaves of each species at a *medium* size.

In pruning, the usual method is, to allow the shoots a certain space, indiscriminately, to every kind of Vine; but surely nothing can be more erroneous.

In regard to distance, it will be easy to observe the foregoing rules: but the consideration of the required length of the shoots is a matter of more difficult determination.

When Vines are in a weak state, they will always require to be short pruned; that is, the shoots in

general should be pruned to two, three, or four eyes each.

And when Vines are only moderately vigorous, shoots should be left about a span long. This, however, must be understood only of spreading Vines that cover a good extent of walling; for Vines, trained in one shoot up the rafters, in a hot-house, require a different treatment.

When Vines are in extreme vigour, they always produce the best grapes from shoots that are left a great length.

The height of a Vinery will seldom admit of shoots, be they ever so strong, being left longer than six or seven feet; but when vigorous Vines are trained in one shoot up the rafters, in a hot-house, they may constantly be pruned to the length of eighteen, twenty, or twenty-two feet. A person unaccustomed to this practice would, from hence, be inclined to deem this mode absurd, and would naturally conclude, that the Vines must be rendered weak by it. It is not, however, from the length of the shoot, but from suffering by the next year's crop, that such danger is to be apprehended.

The extreme parts of these long and vigorous shoots always produce both bunches and berries of a remarkable size. The uncommon large bunches that have been produced in Welbeck gardens have constantly come from the uppermost eye of shoots of the above description.

I have already observed, that the spurs, produced from principal shoots, should invariably be pruned

down to two, three, or four eyes, as occasion may require. And that when these extend too far from the principal shoots, which they will do in time by their annual progress, it will be proper to cut them entirely away: but previous to this, it will always be necessary to make a reserve of fresh shoots to supply their places.

When strong old wood, that is, shoots of four or five years' growth, are to be cut away from any part of a Vine, the operation should be performed with a sharp knife, and the shoot should be cut off close to the bottom, that, when the part skins over, it may become smooth, and not left to grow ragged, as is but too generally practised.

By the common methods of pruning Vines, the bole and large branches generally grow rough, ragged, and unsightly; and when Vines have long been under an injudicious management of this sort, it is hardly possible to reclaim them. But by due care, and discreet management afterwards, it will not be difficult to keep the bole and large branches of Vines smooth, and of an agreeable appearance. I constantly peel off as much of the bark as can be gotten without injuring the Vines, and then wash the branches with strong soap suds; to be applied with a soft brush, such as is used for common painting: the time of winter-pruning is the most eligible season to perform this operation, as then the Vines will not be in danger of bleeding. The soap suds are not only useful for giving the Vines a smooth and glossy appearance, but are also effica-

cious in destroying several species of insects that lodge upon them during the winter.

When Vines, through neglect or mismanagement, are reduced and become weak, nothing better than a few small bunches can be expected from them. The best method to recover them, when in such a situation, is, by cutting them down at the winter-pruning to the lowermost last year's shoot upon each Vine. The next summer's shoots should be divested of all the bunches as soon as they appear, and the shoots should be allowed sufficient space, viz. from twelve or fourteen inches to two feet and a half, according to the kind of Vine, that is, whether it produces small or large leaves. When the shoots are properly disposed, the leaves of one shoot should not be suffered to interfere with those of the next adjoining shoot. Thus, by affording a free admission of sun and air, the new wood will be greatly benefitted.

Vines are often permitted to run into a rude and disorderly state during their progress in the summer. And it is also too prevalent a practice to fix upon certain periods for pruning, or dressing them as it is termed. But Vines, properly managed, require attendance almost daily, and particularly in the beginning of summer. All the supernumerary shoots should be rubbed off as soon as they begin to shoot in the spring, and those only should be retained, which will be required either for fruit or succession of wood.

The Vines will be greatly benefitted by being

thus disburthened of all their unnecessary shoots, which only tend to embarrass them in the regular disposition of the new wood.

In the summer-pruning of Vines, the use of the knife should be avoided as much as possible : it is far more eligible to pinch off the shoots with the finger and the thumb. The acidity of the juices which abound in the young shoots of Vines, cause an immediate tarnish to ensue and appear on the blade of the knife ; and this, if not poisonous, proves very injurious by incorporating with the juices in the wounded part. ^c

As all the different kinds of Vines are not distinguishable by the wood at the time of the winter-pruning, a person, unacquainted with the kinds, might easily be led into an error respecting the proper space which ought to be allowed for the shoots. If the wood should appear crowded, when the leaves are full grown, it will be proper to let it remain in that state during the season of the Vine's bleeding. But the superfluous wood may safely be taken from any part, at the time of the Vine's flowering, as they do not bleed at that season.

I have already observed, that the best season for

^c The ancients were well aware of this circumstance. Virgil, in giving directions for summer-pruning of Vines, expressly says,

“ Nor exercise thy rage on new-born life,
“ But let thy hand supply the pruning knife ;
“ And crop luxuriant stragglers.”

pruning Vines is at the time of the leaves falling ; because when the pruning is deferred till the spring, the Vines are liable to bleed on the rising of the sap, and especially at large incisions, where strong wood has been cut away ; but when Vines are pruned in the autumn, there will be time, during the winter, for the wounded parts to heal, and for the pores to close, before the rising of the sap in the spring. As Vines are sometimes greatly injured by their bleeding, it may not be deemed improper here to say a few words on that subject.

Vines, pruned even in the winter months, will sometimes bleed a little, on the rising of the sap in the spring ; but if a Vine gets wounded at that season, it will, like the birch, bleed copiously from the wounded part. “ It is astonishing,” says Mr. Evelyn, “ that some trees should, in a few hours, “ weep more than they will weigh.”

The discharge from the wounded part is, in a great measure, regulated by the state of the atmosphere.^d

^d “ In order that we may have a distinct view of the motion of the sap, it will be necessary to reflect, that the root, stem, branches, and leaves, are constructed in the same manner. Sallows, Willows, Vines, and most shrubs, will grow in an inverted state, with their tops downward in the earth. Dr. Bradley describes the manner of inverting a young cherry-tree, the roots of which will put forth leaves, and the branches become roots. Hence it is obvious that the nutritive matter may be conveyed as well by the leaves as the roots, their vascular structure being the very same.

“ During the heat of a summer's day, all plants perspire freely

It is easy to stop a gentle oozing from an old wound of a Vine, by applying soft clay, putty, or

from the pores of their leaves and bark. At that time the juices are highly rarefied; and the diameters of the tracheæ, or air-vessels, are enlarged so as to press upon and straiten the vessels that carry the sap. In consequence of which, their juices, not being able to escape by the roots, are pressed upward, where there is the least resistance, and perspire of the excrementitious parts by the leaves and top-branches in the form of vapour. When the solar heat declines, the tracheæ are contracted. The sap-vessels are enlarged, and the sap sinks down in the manner of the spirits in a thermometer. In consequence of this change, the capillary vessels of the leaves and top-branches become empty. Being surrounded with the humid vapours of the evening, they fill themselves from the known laws of attraction, and send down the new-acquired juices to be mixed with those that are more elaborated.

“As soon as the sun has altered the temperature of the air, the tracheæ become again distended, and the sap-vessels are straitened. The same cause always produces the same effect; and this alternate ascent and descent, through the same system of vessels, continues as long as the plant survives.

“The irregular motion of the stem and branches is another cause that contributes to the ascent of the sap. Every time that these parts are acted upon by the air, they are made to assume a variety of angles, whereby the sap-vessels are suddenly straitened. The contained juices consequently receive reiterated impulses, similar to what happens to the blood of animals from the contraction of the heart. This observation may assist us in investigating the vegetable economy, so far as it regards the management of fruit-trees, and, probably, may be extended throughout the whole system of gardening, planting, and farming.

“It may be objected, that trees fixed to the wall do, notwithstanding, carry their sap to the extreme branches; but it should be considered, that the warmth of their situation, assisted

warm wax to the wounded part ; I have, however, sometimes found, that soot, or charcoal-dust ground

by the horizontal direction of their branches, is fully sufficient to propel the sap, without the undulatory motion that I have mentioned.

“ I beg leave to observe, that these observations are only intended to convey a general idea of the motion of the sap. It varies according to the temperature of the weather. The air is seldom one moment alike. The sap must, therefore, sometimes move quick and sometimes slow. It may rise and fall many times in a day. Sudden heats push it upward, sudden colds make it fall. Thus the juices are blended, and the secretions forwarded.

“ The manner that the nutritive juices of the earth and atmosphere are conveyed into the sap-vessels remains to be described. And this makes a necessary part of our present argument, as it may assist us in finding out and explaining the diseases of plants from the variations of the weather.

“ The outer bark, which covers every external part of a vegetable, as well below as above the surface, is full of perspiratory or absorbent holes. The vessels of this bark, being endowed with the power inherent in capillary tubes, draw up the moisture that is applied to their surface. From them it is committed to the vessels of the inner bark. After receiving some degree of melioration, the sap is delivered to the blea. From the blea it passes, by anastomising canals, to the vascular series. From thence to the wood, or flesh, where it receives its last concoction.

“ The nutritive particles, being separated by the mechanism of these numerous canals, are applied towards the fructification and increase of the plant, while the watery and excrementitious parts are carried expeditiously to the leaves, where they are perspired off in the form of vapour. It is evident, however, that, as water contains but few particles that are fit for nourishment, it was necessary that plants should have the power of imbibing

very fine, and mixed with soft soap to the consistence of paste, has proved more efficacious.

a large portion of that fluid. For which reason, the sun-flower, considered bulk for bulk, takes in seventeen times more nourishment than a man, and, consequently, perspires more.

“ During the continuance of dry north-east winds, the leaves of corn are observed to grow yellow, and the early-set fruit frequently falls off. This is owing to the want of moisture in the atmosphere to fill the vessels of the leaves and top branches, whereby the fruit is deprived of nourishment. Under such circumstances, it is probable that wall-fruit may be preserved by prudently watering the leaves and top-branches during the heat of the day. It is, however, a singular happiness, that the air is at no time perfectly free from moisture. Bring a bottle of cold water into the warmest room, and its surface will immediately be covered with a thick dew. An air absolutely dry would, in a few days, annihilate the vegetable creation.

“ The air is justly said to contain the life of vegetables as well as animals. It is a compressible and elastic fluid, surrounding the face of the globe, and reaching to a considerable height above it. Vegetables do not grow *in vacuo*, and animals die when deprived of air. It has two states, being either elastic or fixed. Dr. Hales observes, that in its elastic and active state, it conduces to the invigorating the juices of vegetables; and, in its fixed and inert state, gives union, weight, and firmness to all natural bodies. By his experiments we are informed, that fixed air constitutes near one-third part of the solid contents of the heart of oak. It is found to bear the same proportion in peas, beans, and other vegetable substances. Heat and fermentation render it elastic. It is again capable of being absorbed and fixed. Was the whole air of the universe brought at once into an elastic and repulsive state, every thing would suffer a sudden dissolution. Was it entirely fixed, then all things would be reduced to an inert lump. Almighty Providence has provided against these extremes, and in the most wonderful manner pre-

It is exceedingly difficult, however, to stop the bleeding of a recent wound, and especially when

serves the balance. Air is to be found in every portion of earth; and as it always contains a solution of the volatile parts of animal and vegetable substances, we should be careful to keep our stiff soils as open as possible to its influence. It passes, both in its active and fixed state, into the absorbent vessels of the root, and, mixing with the juices of the plant, circulates through every part. Dr. Hales, in his Statical Experiments upon the Vine, discovered it ascending with the sap in the bleeding season.

“ Having demonstrated that the motion of the sap depends upon the influence of the air, and the power of absorption common to all capillary tubes, it naturally follows that it cannot remain one moment at rest. The gradations from heat to cold, and *vice versa*, are infinite, and sometimes desultory. So must the motion of the sap. From the combinations of the nutritive particles, a number of different fluids are prepared in the same plant. Matter is the same in all; but the modification of it makes things sweet or sour, acrid or mild.

“ The universal juice of a plant is a limpid sub-acid liquor, which flows plentifully from a wound made in a tree when the sap is rising. The Birch and the Vine yield it in great abundance. This liquor, as it moves through the innumerable small vessels, becomes more and more concocted, and is the general mass from which all the juices are derived. It may be called the blood of the plant. By a certain modification it produces high-flavoured oils, gums, honey, wax, turpentine, and even the constituent parts of the plant itself. How this transmutation is performed, remains, and perhaps ever will remain, unknown.

“ I hope it will not be objected to me, that in this essay I have been too minute. In the history of nature we cannot be too particular. Every part of it demands our most serious attention, and every part of it repays us for the labour we bestow. The wings of the butterfly are painted by the same Almighty

the discharge is very rapid ; as in such a case I have sometimes found all the above methods to prove ineffectual : nor will the application of either pitch, bees' wax, or sealing wax, (at the same time searing the wounded part with a hot iron,) answer the intended purpose.

When a Vine bleeds rapidly the most effectual expedient I have hitherto been able to devise to stop its progress is, first, to peel off, or divest that part of the branch adjoining the wound of all the outside bark ; then with a sponge to dry up the moisture, and immediately to wrap round the wounded part a piece of an ox's bladder, spread over with tar, or pitch, made warm in the manner of a plaster. The whole must be securely tied with a strong thread, well rubbed with bees' wax.

The bandage and bladder should be permitted to remain upon the branch for the space of three weeks, or a month, after the operation is performed.

hand that made the sun. The meanest vegetable, and the most finished animal, are equally the care of Providence. We constantly view the wisdom of God in his works ; and yet, as the wise man observes, 'hardly do we guess aright at the things that are upon the earth, and with labour do we find the things that are before us.'

Georgical Essays, by A. Hunter, M. D. page 79.

GENERAL OBSERVATIONS
ON
WATERING THE VINE.

ALTHOUGH it is necessary that the situation of the Vine should be perfectly dry, and more especially in a cold climate where the winters are frequently very severe, yet Vines require a plentiful supply of water during summer, particularly in a hot dry season, and at the time of the swelling of the grapes.

In hot countries, the Vine is said to grow the most luxuriant in a situation which is near the water^a; but it is generally allowed, that the

^a The patriarchs and prophets frequently represent, in Scripture, the flourishing state of a nation, a tribe, or family, under the emblem of a Vine growing near water.

“ It was planted in a good soil by great waters, that it might bring forth branches, and that it might bear fruit, that it might be a goodly Vine.” *Ezekiel*, xvii. 8.

“ Thy mother is like a Vine in thy blood, planted by the waters: she was fruitful and full of branches, by reason of many waters.” *Ezekiel*, xix. 10.

“ Joseph is a fruitful bough, even a fruitful bough by a well; whose branches run over the wall.” *Gen.* xlix. 22. The Vine,

flavour of the grapes, from Vines in such a situation, is much inferior to that of grapes growing in a dry soil.

I have already observed, in my directions for the preparation of the Vine-border, the absolute necessity of having drains at the bottom, to take off the superfluous water: by this means the border may be kept in a dry state during winter; and, in summer, water may be given as the season and other circumstances may require.

In spring, gentle and frequent waterings, in dry weather, generally answers better than giving them in greater quantities.

When the Vines are in flower, even the frequent sprinkling of the flues and walks in a hot-house, and the border, &c. in a Vinery, will greatly benefit the Vines. A good heat, however, should be kept up at the same time, as I have constantly experienced that grapes set best in a vaporous heat of between seventy and seventy-five degrees.

In a hot-house, if the walks, &c. are sprinkled when there is a strong sun, the exhaled moisture will instantly form a kind of artificial dew, which

indeed, is not expressly named here, but this tree, nevertheless, appears to be principally intended, on account of its very spreading nature, as appears from the two texts in Ezekiel, and particularly as it is remarkable for over-topping the walls it is planted against. See the beautiful allegory in Psalm lxxx. of the over-prosperous condition of the Israelites: — “Thou hast brought a Vine out of Egypt.”

is exceedingly nourishing to the grapes in their infant state.

When strong fires are kept, if the flues are frequently sprinkled with water, the heat of them will cause a steam to arise, which will also have a good effect.

When the grapes are grown to the size of small pease, the Vines will require a constant supply of water, till they are full grown. If the border be kept in a moderate moist state during the above period, the Vines will grow luxuriant, and the grapes will swell to a large size.^b But when the

^b I have frequently had berries of various kinds of grapes, that have weighed between eight and nine pennyweight each.^c

I shall here beg leave to remark, that the berries of all the different sorts are not equally ponderous in proportion to their dimensions. Those kinds which have thick skins, and have flesh of a hard and firm texture, are more weighty than the thin-skinned grapes, with delicate and juicy flesh. From hence we may reasonably infer, that the latter are most easy of digestion, and consequently much more wholesome.

A round thin-skinned berry, which weighs between seven and eight pennyweight, will generally girth about four inches; and one of the same weight, of an oval form, about three and a half inches.

Although grapes of the above description may be deemed exceeding large in this country, yet we are informed that they grow to a much larger size in some parts abroad. It is even said, that they are sometimes as large as pigeons' eggs.

Two illustrious travellers *, who have published their observations on the present state of *Asia Minor*, in their journey

* *Ægidius Van Egmont*, envoy from the States to the King of Naples, and *John Heyman*, professor of the Oriental languages in the University of Leyden.

grapes are nearly ripe, the waterings should be less frequent, as too much water at that season would tend to debase their flavour.

from *Ephesus* give a curious description of a prospect they enjoyed, of a successive course of hills and mountains extending from thence, and of a beautiful valley at the bottom of them, through which the river *Cayster* flowed and emptied itself into the sea. “ Among these, the lofty *Tmolus* rises eminent above the rest ; but is more distinguished for the excellence of its wines. At the bottom of the extremest mountain near the sea, several magnificent ruins still remain to be seen of *Sardis*, the metropolis of *Lydia*.”

“ This delightful country is now but thinly inhabited by a few poor *Turks*, and some wandering *Arabs*, and few wines are now made there but by some Greek monks, and chiefly for their own use. Some of these, though made with little art and culture, are light, generous, and very agreeable.” But these gentlemen give a different account of a town called *Sidonijah*, which was famous for the goodness of its wines, and the quantities made there. “ This town is four hours’ journey distant from *Damascus*, in the extremity of a fertile extended plain, the see of a bishop, and entirely inhabited by *Greek Christians*.”

“ Some of the grapes here are of a remarkable size, as large as a pigeon’s egg, and of a very exquisite taste ; great quantities of them are sent to *Europe*, and known by the name of Damask raisins. The wines are not made from this kind of grapes, which are chiefly cultivated in their gardens, but from the Vines of the adjacent mountains, of which *Hermon* and *Lebanon* are nearest.” These gentlemen say (vol. ii. page 260.) that the wine which they drank there was, indeed, incomparable. “ The best is made by the monks, who have there a celebrated convent. It was of a red colour, very generous, grateful, and so light as not to affect the head, though taken freely.”

When the crop is gathered, the border should be frequently watered till the leaves of the Vines begin to change from green to red and yellow respectively. But from that time, and during the winter, the border should be kept in a dry state.

I have not at any time found it necessary to water the leaves of Vines growing in the pine-stove, as is by some recommended, except such as have been infested with insects. But during a mild rain, I have frequently let down the upper lights of the hot-house, that the Vines at the back wall might reap the benefit of the shower.

There is yet another mode of watering the Vine-border, which is worthy of observation.

During winter, I have frequently watered the Vine-border with a thick black liquor, the drainage of dunghills^c; and though this practice was in-

^c The drainage of dunghills is the very strength and power of the dung; for water, constantly filtering through stable-yard dung, certainly robs it of the mucilage and saline particles, with which it greatly abounds when newly made; and especially such dung as has lain a considerable time in the stable, and imbibed a large portion of the urine of the horses. The saline particles contained in new-made dung are increased by its fermentation; therefore the first extract obtained from the dung, after it has undergone its fermentation, may be justly considered as the cream or essence of the manure.

In most farm-yards this valuable liquor is generally permitted to run to waste, which is much to be regretted, and may, in reality, be deemed a public loss.

The farmer would find his labours well rewarded, by conveying this rich liquor to the most convenient part of his farm,

tended solely to enrich the soil, yet it is not improbable but this powerful liquor, by being impregnated with saline particles, may communicate

which might easily be done by the help of a water-cart, such as is used to convey water to lay the dust in the streets and roads, about cities and great towns.

Manure is an article of such vast importance in husbandry, that the farmer ought to pay the greatest attention possible to the enlargement of his stock of dung. It is to be wished that it would become a practice to stow the farm, fold, and stable-yards, with leaves of trees, rotten tan, noxious weeds, saw-dust, moory earth, and such like materials. These should be introduced before the dunghill is formed, and should be laid to a considerable thickness in the lowest part of the yard, as they would there receive and imbibe the riches that drain from the dung above.

If this method of proceeding were introduced, many farmers would have an opportunity of collecting materials, whereby they might increase their stock of dung to more than twice its usual quantity.

Although soils of different qualities admit of improvement by various modes of practice, yet, without the aid of manure, the farmer would find his utmost exertions of but little value. And though some have endeavoured to prove that the earth, when duly pulverized by the action of the plough, does not require manure *, yet experience tells us that it is the very life and soul of husbandry; and when judiciously applied on almost every kind of soil, its effects will seldom disappoint the expectation of the farmer.

* *Mr. Tull, in his New Husbandry, tells us, that where the ground is properly managed, manure is an useless article; but his opinion is now generally and justly exploded.*

a warmth to the roots of the Vine during the winter, and thereby prove serviceable in that respect also. However that may be, from the uncommon vigour of the Vines at this place, I have been led into a belief of the utility of this practice. But let me at the same time observe, that I have always applied this powerful manure (if I may so call it) with great caution. I have found the beginning of winter the most proper time for using this kind of manure; and then I only venture to give two or three plentiful waterings, fearing that if this were to be applied either in the spring or the summer, or even in too great quantities, it might tend, from its great power, to cause the leaves of the Vine to change from a green to a yellow hue. I offer this, however, only as a probable speculation; for I do not certainly know that it would produce that effect, though used in summer. It seems, however, most reasonable to suppose, that it should be applied when the roots of the Vine are in a state of inaction; as then a winter's rain and frost may, probably, contribute to qualify it, and to incorporate it with the soil.

ON

GRAFTING.

BOOK III.

GRAFTING of Vines is a practice little known in this country, though the advantages resulting from it are many and important.

I shall first endeavour to state some of the most important advantages of grafting Vines, and then lay down the necessary directions for performing the manual operations.

First, when a wall is planted with inferior kinds of Vines, the usual method of stubbing them up, and supplying their places with better sorts, is attended with much expense and loss of time ; as in that case it will be necessary to renew the border with fresh compost mould ; and several years must elapse before the wall can be completely furnished with new Vines ; but, by grafting, the nature of the Vines may be changed, without expense or loss of time ; for I constantly have good grapes from the same year's graft ; and in a hot-house the grafts, if permitted, will frequently shoot thirty or forty feet the first summer.

Secondly, in small Vineries, or Vine-frames, where it would be inconvenient at least, if not impossible, in the common way, to have any considerable variety of sorts, they may be procured by grafting different kinds upon one and the same plant. A Syrian Vine, now (1789) growing in the hot-house at Welbeck, produces sixteen different sorts of grapes.

But what I deem the most important advantage is, the improving of the various kinds of grapes, and particularly the small kinds, which generally make weak wood. This may be done, as I have constantly experienced, by grafting the weak and delicate-growing Vines upon the stocks of those that have more robust and vigorous stamina.^a

The Syrian Vine is, of all others, the most proper to be used for stocks to graft upon, and plants raised from seed of this sort are greatly preferable to plants raised either from layers or cuttings. If the seed chance to degenerate to a kind of wildness, the plants will still be the better for stocks, because they will, on that account, rise with greater vigour.^b

^a The advantages to be gained by engrafting have appeared conspicuous in many instances, particularly in the small blue Frontinac, engrafted on the Syrian Vine at Welbeck, which has constantly produced well-sized handsome bunches, with berries almost as large as those of the black Hamburgh.

^b The trees, which of themselves advance in air,
Are barren kinds, but strongly built and fair :
Because the vigour of the native earth
Maintains the plant, and makes a manly birth.

It may, perhaps, be imagined, that stocks of the above description would tend to debase the flavour of the grapes grafted upon them ; but experience teaches us, that the stock does not impart any such quality to the fruit ; for it is well known that the Golden Pippin, when grafted upon a crab-stock, produces the highest-flavoured fruit.

It has been asserted, that great advantages might or would result from grafting the Vine upon the cherry-stock. *

Yet these, receiving grafts of other kind,
Or thence transplanted, change their savage mind ;
Their wildness lose, and quitting nature's part,
Obey the rules and discipline of art.

VIRG.

* “ If a *Vine* be grafted on a common cherry, or any other of the kind, the grapes which it produces will be so *remarkably* forward, as to be ripe in the season of *cherries*. But it is very difficult to graft a Vine well on a cherry-stock, so as to make it thrive and flourish. The following method has, however, been generally successful.

“ First, bore a hole with an auger in the trunk of the cherry-tree ; in this hole insert the scion of the Vine, and let it grow there till it has filled the hole of the auger, and is closely joined to the cherry-tree. Then cut off the Vine-branch from the Vine, after which it will draw all its nourishment from the cherry-tree, whose sap will hasten the formation and maturity of the grapes, which will be ripe near *two months* sooner than ordinary.” *

I have, from experience, great reason to believe, that the Vine and cherry will not be made to unite and incorporate,

* *A Treatise on Grafting and Inoculation* (anonymous), Salisbury, 8vo. 1780 ; and sold by Fielding.

Now though I dare not hazard the recommendation of a method founded on such chimerical principles, I shall be far from prejudicing my readers against any experiments of the sort: I do not assert that this process cannot succeed, but this I beg leave to suggest, that it would be right for those who choose to make the trial, not to entertain too sanguine expectations of its success. In a pursuit of this kind, the operator would do well previously to consider the affinity that ought to

even by inarching, which is the most certain of all the ways of grafting; and much less by the method as set forth above. For the cutting of the scion and stock smooth, and fitting them together with exactness, are the first principles in grafting; whereas boring with an auger will naturally bruise and tear the bark, and must therefore destroy these intentions.

“ The *Certosa* [Carthusians *] stands in a fine air and pleasant situation, in the midst of vineyards. They have several courts with cloysters, one as large as the great court of *Trinity College, Cambridge*. Each father has to his cell a pretty garden, some of which are very curious, having many exotic plants, &c.

“ One of them had fish in his cistern, which ate lettuce out of his hands. This father had tried some experiments in grafting; as of a Vine on a fig-tree, Jasmine on an orange, which had taken and grew. † All of them have some employment for their vacant hours.” ‡

* *At Bologna.*

† *This account may serve to pass among monastic legends, but it is too absurd to gain credit with the professional gardener.*

‡ *Observations made in travelling through France and Italy, &c. by Edward Wright, Esq. vol. ii. page 435.*

subsist between the stock and the scion, as plants will not unite and harmonize from their similar external appearances. It is necessary that the stock and the scion should be both of the same family, or lineage, according to the sexual system of botany, in order to form a substantial and lasting union.

Having pointed out some of the principal advantages accruing from engrafting of the Vine, I shall now explain the method of performing the manual operation.

At the pruning season, make choice of cuttings for grafts, or scions, from the best bearing branches of the sorts of Vines intended to be propagated. In general, the bottom part of the last year's shoot is to be preferred; but in well-ripened vigorous wood, any part of the shoot will answer, provided it be not too long-jointed. The cuttings should be preserved in pots till the grafting season, in the manner already described, page 69, &c.

The proper season to graft Vines depends upon their situation. Vines in a pine-stove should be grafted in the beginning of January, but the middle of March is a proper season to graft Vines growing in the open air. In general, Vines should be grafted about three weeks before they begin to break into bud.

Upon small stocks, not more than one inch in diameter, cleft-grafting will be found the most proper; but upon larger stocks whip-grafting is to be preferred.

In both methods, much care should be taken in fitting the stock and scion together, and the operation should be performed with great exactness.

When the stock and scion are well fitted, the graft should be fastened with the strands of bass-matting, and should then be covered with clay in the usual way.

Vines do not harmonize with so much freedom as commoner fruit; for though the scion will sometimes begin to push in a few weeks, yet it will frequently remain in a dormant state for two or three months; and during this period, it will be necessary to strip the stock of all the shoots it may produce as soon as they appear; and, in order to preserve the scion in a vegetative state, it will be absolutely necessary to keep the clay moderately moist, which may easily be effected by wrapping it round with moistened moss, and keeping the moss constantly sprinkled with water.

When the scion has made shoots five or six inches long, the clay and bandage should be carefully taken off; and the clay may be removed, without injuring the graft, when it is in a moist state.

Vines will frequently prove successful by both the above-mentioned methods, but still the most eligible way of all seems to me to be that of grafting by approach: indeed I have seldom known any plants miscarry, that have been grafted this way. Now in this case it is necessary to have the plant, intended to be propagated, growing in a pot. Strong plants, that have been two or three

years in pots, are to be preferred ; but plants from the nursery may be potted, and grafted in the same season, if brought into a hot-house or Vinery ; for the great warmth of either will generally cause plants, brought out of the open air, to push with vigour, and to form new roots, which will support the plant, and greatly facilitate its forming an union with the stock.

I have constantly had fine grapes, and the grafts have made good wood the first season, by every method of grafting, but particularly by the last. In which it is obvious that the graft has a double support, viz. from the stock, as well as from the plant in the pot.

In this method it will be necessary to let the clay and bandage remain two or three months after the graft has formed an union ; for if taken off at an earlier period, the grafted part of the plant will be very liable to spring from the stock.

The pot should be plentifully supplied with water till the month of August, when the graft should be separated from the plant in the pot. Two or three inches of wood below the bottom of the graft may be left, but should be taken clean off at the next winter's pruning.

ON THE DIFFERENT
SPECIES OF INSECTS
THAT INFEST
THE VINE;

WITH PROPER METHODS OF DESTROYING OR
PREVENTING THEM.

ALTHOUGH the Vine is not very liable to be infested with insects when growing in the open air in this country^a, yet few plants suffer more from their ravages than Vines under glass, especially those growing in pine-stoves.

^a I believe the vineyards abroad are not generally subject to be infested with insects. We are informed, however, that there have been instances where the Vines have been so greatly injured as to cause a considerable decrease in the produce of the vintage. This, I presume, only happens in dry summers, and in the countries that lie near the tropics.

“ The isle of Pico has its name from the peak or high mountain upon it. This island is not only the largest, but also the most populous of the Azores, containing 30,000 inhabitants. It has no corn fields, being every where covered with vineyards, which have a most enchanting appearance on the easy slope at the foot of the mountain. The season of vintage is the

The constant warmth kept in hot-houses during winter, serves to preserve the succession of various destructive insects from one season to another. I shall here mention the several sorts with which the Vine is liable to be infested, and then prescribe the proper methods for destroying or preventing them.

1. The *Acarus*, commonly called the Red Spider. This species is, doubtless, the most pernicious; and as fire-heat greatly encourages its increase, it generally abounds in most hot-houses.

season of mirth and festivity; when a fourth, or even a third part of the inhabitants of Fyal remove to Pico with their families, down to their smallest domestic animals. It is affirmed that a quantity of grapes, which would yield three thousand pipes of wine, are eaten at that time; every person indulging his taste with this delicious fruit, though no people are more sober and frugal at their meals than the Portuguese. Formerly the vintage produced annually 30,000, and sometimes in fortunate years 37,000 pipes of wine; but a kind of disease attacked the Vines some years ago, which caused the leaves to drop off at the time when the grapes require to be sheltered from the sun: I suspect this to be caused by some species of insect." *Forster's Voyage*, vol. ii. p. 597.

"In Spain, the season of making wine is looked upon as a time of great festivity, and celebrated with rejoicings that border on licentiousness. While the vintage continues, all distinction and respect is forgotten: the owner of the vineyard puts aside his austerity with his cloak, and cries out to his servants, — 'Let us be merry, my companions, wisdom is fled out of the window.' A custom that has been preserved in this country ever since the Romans set footing in it."

Carter's Journey from Gibraltar to Malaga, vol. ii. p. 397.

The Acari frequently attack the leaves of the Vine early in the summer ; and as their increase in dry weather is amazingly quick and great, they will, without some method of controul, soon greatly endamage, and, in time, totally destroy the foliage.

They generally reside and breed on the under-side of the leaves, and the infested leaves are very distinguishable as soon as they are attacked by them ; for the insect wounds the fine capillary vessels with its proboscis, and this causes the upper surface of the leaf to appear full of very small dots, or spots of a light colour. When the Acari are very numerous, they work a fine web over the whole under-side of the leaf, as also round the edges thereof ; and it is curious enough to observe, that they commonly carry this web in a straight line, from one angular point of the leaf to another, on which boundary line, in a warm day, they pass and repass in very great numbers.

The Acari, however, do not confine themselves to the leaves only, but attack the bunches of grapes also, especially at the time when they are almost ripe ; and as they extract the juices from them, the grapes soon become soft, flabby, and ill-flavoured.

2. The Thrips. This species abounds in most hot-houses, and is hurtful to most plants kept in them. It is often injurious to Vines growing there ; and, as I have observed, more particularly so to the sorts that produce white berries.

This species, however, is not confined to the hot-house only, but is commonly found upon plants growing in the open air, as also upon flowers. These insects are often very numerous upon the flowers of pinks and carnations.

The Thrips sometimes attack the young shoots of Vines growing in the open air, especially those of weak Vines, or Vines newly planted.

If young shoots chance to receive any injury by late spring frost, the tender part of the leaf will immediately curl up, and change to a dark-brown colour; and in this state the Thrips generally attack them with great greediness, especially the white Sweetwater and white Muscadine kinds. These sorts are generally planted against common walls.

The Thrips, however, are seldom injurious to Vines growing in the open air, except in the spring; and to those in the hot-house they are most hurtful when the grapes are nearly ripe. They attack the bunches as well as the leaves, and commonly prey upon the extremities of the berries, but more particularly at the end next the foot-stalk. In white grapes, the part of the berry injured changes to a dark colour, the foot-stalk turns black, and the berry withers.

3. The Aphis. The Aphides are, I believe, the most numerous of all the insect tribe. This species infests the brawny oak, as well as the minutest weed. What are called honey-dews in the summer, are occasioned by this species of insect. The

young shoots of Vines are sometimes infested with the Aphides; but as Vines generally grow exceedingly rapid, these insects do not often greatly injure them.

4. There are two or three kinds of Cocci that sometimes infest the Vine, viz. the *Coccus Hesperidum*, and the *Coccus Adonidum*. But as such instances rarely occur, and these insects are not very prejudicial to the Vine, I shall pass over them with only observing, that the latter of these are sometimes mistaken for the crimson-tinged Pine-bug. These often abound both in hot-houses and conservatories, and breed upon many kinds of plants kept in them, such as the coffee-tree, the oleander, &c.

Having mentioned the several species of insects with which the Vine is liable to be infested, I shall now lay down the proper methods for destroying them.

All the foregoing species of insects, the *Acarus* excepted, may be destroyed by a strong fumigation of tobacco.

The method of fumigating hot-houses, &c. either by the bellows or by the smoking-pot, being now generally understood, it is unnecessary to say much upon this head; I shall, therefore, only beg leave to subjoin the following observations:

1st. It would be improper to fumigate either Vinery or Pine-stove, where there are Vines late in the spring or in the summer, because the smoke

would injure the grapes, by giving them a disagreeable flavour.

2dly. When either a Hot-house or Vinery is infested with any of the above-mentioned insects, or when they may have been very numerous the preceding season, it will be necessary to destroy them effectually, before the Vines come into flower; and this may be done by fumigating two or three different times, at the distance of three or four days between each operation.

Pine-stoves are much more liable to be infested with these insects than either Grape-houses or Vineries; because in the latter it is usual to take off the glass-frames during the winter, by which means the insects generally perish. But the warmth of Pine-stoves serves to protect the insects through the winter, as I have already observed.

In Pine-stoves, the Thrips are often greatly encouraged by many kinds of vegetables kept there, and particularly by kidney-beans. The increase of the insect upon this plant in the spring is so exceedingly rapid, that it is not unusual to see whole crops of this plant entirely destroyed by them. In order, therefore, to prevent the increase of these insects, it will be expedient, after the stove has been fumigated, first to remove all such plants as encourage them; then to sow a fresh crop of kidney-beans in pots immediately, and these should be placed all over the flues, &c. so that in case any insects should have escaped the fumigation, the young bean-plants may attract

them ; and as soon as these plants appear to be infested, take them away, and sow a fresh crop for the same purpose.

Of all the insect-tribe, the Acari are the most pernicious, and particularly so to Vines growing in Pine-stoves ; indeed, they often prove fatal to them.

Before I had discovered an effectual method of destroying them, it used to grieve me much to see the Vines often in a languishing state from these insects ; and as I still frequently see Vines growing in Pine-stoves in the same predicament, I flatter myself that what I have now to offer upon this head will not be deemed the most unacceptable, or least useful, part of this work. For I can assure my readers, that I have, by many years' experience, found the following method efficacious and satisfactory in every respect :

To one pound of flowers of sulphur put two ounces of common Scotch snuff (very good tobacco dust will answer equally well). Let these be well mixed together : then take a small brush, such as is used for common painting, dip it lightly in the sulphur, then lay one hand on the upper surface of the leaf, and with the other draw the brush very gently backwards and forwards all over the under-side : by this means a little sulphur will be left on the leaf. The Acarus being soft and delicate in its nature, is hereby destroyed with the most gentle touch. The brush also most readily wipes off their web as well as their globular trans-

parent eggs, which are by a fine membrane fastened to the leaves ; and thus we are secured from the danger of a succeeding brood.

This process may to some have the appearance of a tedious operation ; and, indeed, when Vines are injudiciously trained, it certainly must be attended with great trouble : but it is very easily performed upon Vines trained in the regular method here set forth, and a single operation is generally sufficient for a whole season.

I have commonly given a general dressing to the Vines in the Pine-stove at Welbeck, as soon as I have observed the Acari make their appearance upon any part of them ; and I have seldom found it needful to repeat the operation during the summer.

I shall just beg to observe, that sulphur alone is sufficient for the above purpose ; but the small quantity of snuff recommended to be used along with it renders the mixture equally powerful and fatal to the Thrips also, and therefore the more advisable.

ON THE
AGE AND STATURE
OF
THE VINE;
AND OF THE
DURABILITY OF VITIGINOUS WOOD.

THERE is no part of the History of the Vine so astonishing as that of its age and stature; of all the various kinds of fruit-bearing trees that endure the climate of this island, the Vine is the most unlikely to exceed in either of these particulars. Without the assistance of man, and the aid and support of some other tree, the Vine certainly would be of a very humble growth^a; for,

^a “Grapes are not only spontaneous in *Carolina*, but in all the northern parts of *America*, from the latitude of 25 to 45; the woods are so abundantly replenished with them, that in some places, for many miles together, they cover the ground, and are an impediment to travellers, by entangling their horses’ feet with their trailing branches; and lofty trees are over-topped and wholly obscured by their embraces. From which indications one would conclude, that these countries were as much adapted for the culture of the Vine as *Spain* and *Italy*, which

indeed, the idea one forms of a Vine-tree, in its rude and natural state, is exceedingly similar to that of a large bramble-bush^b; yet, by care and

lie in the same latitude. Yet by the efforts that have been hitherto made in *Virginia* and *Carolina*, it is apparent that they are not blessed with that clemency of climate, or aptitude for making wine, as the parallel parts of Europe, where the seasons are more equal, and the spring not subject, as in *Carolina*, to the vicissitudes of weather, and alternate changes of warmth and cold, which, by turns, both checks and agitates the rising sap, by which the tender shoots are often cut off. Add to this the ill effects they are liable to by too much wet, which frequently happening at the time of ripening, occasions the rotting and bursting of the fruit.

“ Though the natural causes of these impediments may not presently be accounted for, yet it is to be hoped that time and an assiduous application will obviate these inclement obstructions, of so beneficial a manufacture as the making of wine may prove.” — *Catesby's Natural History of Carolina*, vol. i. p. 22.

^b Although the Vine makes but a mean and despicable appearance in its rude and natural state, yet scarcely any plant surpasses it in elegance and beauty when trained by art.

Vines judiciously propagated against a wall have a most pleasing appearance; and if trained, as often is practised on the roof of a hot-house, &c. and the different kinds of grapes (with their various-coloured berries) are intermixed with propriety, there is a wonderful richness and beauty at the time when the fruit is near ripe. But the method of training Vines, in the manner of festoons, as practised in some parts of Spain and Italy, affords a scene superb almost beyond the powers of description.

“ I walked leisurely the best part from *Molin de Reys* to this town *, with a prospect sufficiently fine all around me, to

* *Barcelona*.

proper cultivation, we find it sometimes arrive to a large bulk, and in point of longevity to vie even

put any body in mind of the Elysian fields. It consisted of an endless continuation of Vines, supported by mulberry-trees regularly planted, the Vine-branches so disposed as to form rich festoons from one tree to the other. I have seen such festooned vineyards in some parts of Italy, especially in the duchies of Mantua and Modena, with this only difference from the Catalonian fashion, that instead of mulberry-trees, the Modenese and Mantuan Vines are supported by elms.

"Think how rich the Catalonian soil must be, that affords nourishment not only to those Vines and mulberry-trees, but also to the wheat that is sown under their shade!* Nay, there are vineyards in this country in which, after the corn-crop, they get another of some other grain. What a delightful object to the eyes of the honest husbandman, to see so much fertility come thus forth to reward his well-spent labours!"

Baretti's Travels, vol. iv. p. 73.

It is much to be regretted that Mr. Baretti did not investigate and describe the soil which is said to be thus prolific. The festoon-vineyards in Lombardy are not less elegant than the above, although the Vines are there trained somewhat differently. A celebrated author has thus described them:

* *Mr. Swinburne, in his Travels through Spain, says, "Their vintages are commonly very plentiful. This autumn, 1775, there was such a superabundance of grapes in the valley of Talarn, in the neighbourhood of Pallas, that whole vineyards were left untouched, for want of vessels to make or hold the wine in. Notice was pasted upon the church-doors, that any one was at liberty to take away what quantity he pleased, on paying a small acknowledgement to the proprietors. The best red wine of Catalonia is made at Mataw, north of Barcelona, and the best white at Sitges, between that city and Tarragona."* Page 65.

with the venerable oak. Many kinds of fruit-trees, and even some that rise to a competent size, much resembling timber, are, nevertheless, exceedingly short-lived; so that though some few of the mulberry-trees planted in the reign of King James the First may be yet in a fruit-bearing state, and also some of the fig-trees at Lambeth palace

“The country of *Lombardy* is perfectly flat, a rich soil, fine pastures and corn-fields, abundance of Vines, and white mulberry-trees for the silk-worms, the Vines running up their branches. This country is the finest we saw in *Italy*, unless you'll except the *Campagna Felice* about *Naples*.

“We observed few timber-trees,” only elms and poplars, which support the Vine-branches, as I observed before, of the mulberry-trees. The roads are very broad and even, and most pleasant travelling in the summer; but some of them deep enough in the winter: the hedges by the road-side are many of them cut, and managed with a great deal of exactness. The Vines run up the bodies of the trees, and intermix themselves with their branches (*altas maritane populos*); and the extremities are drawn out from tree to tree, and hang in festoons between them along the road hedges. From those hedges there go rows of trees along the grounds, at about forty or fifty yards' distance from each other; the Vines all running up their bodies. And here, besides the festoons hanging from tree to tree, the Vine-branches are extended right and left, and fastened to a row of stakes on each side, which run parallel to the trees; and these stakes are as so many pillars, supporting a sort of pent-house, or oblique roof, which is formed by the Vine-branches on each side of the trees. Thus are the grounds disposed and planted on both sides the road, and the trees with the Vines managed in this sort of natural architecture, generally speaking, all over *Lombardy*.”

Wright's Travels, vol. i. p. 31.

thought coeval with Archbishop Laud, yet these are no impeachment of the truth of the observation, since it is no uncommon thing for men to see trees running into apparent decay, which their own hands have raised and planted: it consequently is a circumstance most remarkable, relative to the Vine, that it is of such a lasting duration as to survive many ages.

Mr. Miller, in his Gardener's Dictionary, tells us, that the vineyards in some parts of Italy will hold good above 300 years, accounting those of 100 years as young Vines.

Astonishing as the above account respecting the age of the Vine may appear at first sight, the wonder will, in a great measure, cease, when we compare it with the following passage taken from Mr. Evelyn's *Silva*, in which that of its bulk will not seem less surprising.

“ The particulars were too long to recount of the old *Platanus*, set by *Agamemnon*, mentioned by *Theophrastus*, the Herculean Oaks, the Laurel near *Hippocrene*, the Vatican *Ilex*, and the Vine which was grown to that bulk and woodiness, as to make a statue of *Jupiter*, and columns in *Juno's* temple: at present it is found that the great doors of the cathedral at *Ravenna* are made of such Vine-tree planks, some of which are twelve feet long, and fifteen inches broad, the whole soil of that country producing Vines of a prodigious growth.

“ Such another in *Margiana* is spoken of by *Strabo*, that was twelve feet in circumference. *Pliny* mentions one of *six hundred* years old in his time; and at *Ecoan*, the Duke of *Montmorency*’s house, is a table of a very large dimension, made of the like plant; and that which renders it the more strange is, that a tree growing in such a wreathed and twisted manner, rather like a rope than timber, and needing the support of others, should arrive to such a bulk and firm consistence; but so it is, and *Olearius* affirms, that he found many Vines near the *Caspian* sea, whose trunks were as big about as a man.”

“ *Pliny* speaking of the Vine, says, the ancients very justly reckoned Vines among trees, on account of their magnitude. We see now an image of Jupiter at *Populonium*^c, made out of one^d, and incorrupted after so many ages. Also a *Patera*^e, at *Massilia*.^f At *Metapontum*^g, the Temple of *Juno* was supported by vineal columns. And even now, as reported, the roof of the Temple of *Diana* at *Ephesus* is ascended by ladders made of one *Cyprian* Vine, for in Cyprus they grow up to an extraordinary size. No wood is of a more lasting nature.” Lib. xiv. chap. 1.

The naturalist observes afterwards, and very sensibly, that the above particulars are to be understood of Vines in their rude and uncultivated state,

^c A city of Italy.

^d A single stock only.

^e Sawn across, we must suppose, and not longitudinally.

^f Marseilles.

^g Metapontum is in Calabria.

since by pruning and dressing the vigour of the stock is distributed and transfused into the branches.

I have been informed that there are, upon the Barbary coast, Vines now growing of surprising dimensions, some of them having trunks eight or nine feet in circumference. If the age of these could be ascertained, it would, no doubt, be found equally astonishing. We are not informed whether it be any particular kind of Vine that grows to this amazing size, or whether the size ought not to be attributed to the genius of the soil and air of that country.

We cannot possibly expect such surprising instances of antiquity in this country, on account of the unfavourableness of our climate from the northern situation of the island.

Indeed we learn from history that grapes, as well as most other sorts of fruit, were brought by slow degrees, into the western parts of Europe, and principally from Asia and Egypt.^h

^h "In the more remote ages of antiquity, the world was unequally divided. The east was in the immemorial possession of arts and luxury, whilst the west was inhabited by rude and warlike barbarians, who either disdained agriculture, or to whom it was totally unknown. Under the protection of an established government, the productions of happier climates, and the industry of more civilized nations, were gradually introduced into the western countries of Europe, and the natives were encouraged, by an open and profitable commerce, to multiply the former, as well as improve the latter. It would be

The Vine, however, when planted in a soil it delights in will grow to an amazing size and ex-

almost impossible to enumerate all the articles, either of the animal or the vegetable reign, which were successively imported into Europe from Asia and Egypt*; but it will not be unworthy of the dignity, and much less of the utility of an historical work, slightly to touch on a few of the principal heads.

“1st. Almost all the flowers, the herbs, and the fruits, that grow in our European gardens, are of foreign extraction, which, in many cases, is betrayed, even by their names: the apple was native of Italy, and when the Romans had tasted the richer flavour of the apricot, the peach, the pomegranate, the citron, and the orange, they contented themselves with applying to all these new fruits the common denomination of *apple*, discriminating them from each other by the additional epithet of their country.

“2d. In the time of Homer, the Vine grew wild in the island of Sicily, and, probably, in the adjacent continent; but it was not improved by skill, nor did it afford a liquor grateful to the taste of the savage inhabitants.† A thousand years afterwards, Italy could boast, that of the fourscore most generous and celebrated wines more than two-thirds were produced from her own soil.‡ The blessing was soon communicated to the Narbonnese province of *Gaul*; but so intense was the cold to the north of the Cevennes, that, in the time of Strabo, it was thought impossible to ripen the grapes in those parts of Gaul.§ This

* *It is not improbable that the Greeks and Phœnicians introduced some new arts and productions into the neighbourhood of Marseilles and Gades.*

† *See Homer Odyss. lib. xiv. ver. 358.*

‡ *Plin. Hist. Natur. lib. xiv.*

§ *Strab. Geog. lib. iv. p. 223. The intense cold of a Gallic winter was almost proverbial among the ancients.*

pansion, even in this country. I shall beg leave here to produce two or three instances of Vines covering a surprising area of walling.

difficulty, however, was gradually vanquished; and there is some reason to believe, that the vineyards of Burgundy are as old as the age of the Antonines. *

“3d. The Olive, in the western world, was the companion as well as the symbol of peace. Two centuries after the foundation of Rome, both Italy and Africa were strangers to that useful plant; it was naturalized in those countries, and at length carried into the heart of Spain and Gaul. The timid errors of the ancients, that it required a certain degree of heat, and could only flourish in the neighbourhood of the sea, were insensibly exploded by industry and experience. †

“4th. The cultivation of flax was transported from Egypt to Gaul, and enriched the whole country, however it might impoverish the particular lands on which it was sown. ‡

“5th. The use of artificial grasses became familiar to the farmers both of Italy and the provinces, particularly the Lucerne, which derived its name and origin from Media. § The assured supply of wholesome and plentiful food for cattle

* *In the beginning of the fourth century, the orator Eumenius (Panegyric. veter. viii. 6th edit. Delphin.) speaks of the Vines in the territory of Autun, which were decayed, through age, and the first plantation of which was totally unknown. The Pagus Arobrignus is supposed, by M. Danville, to be the district of Beaune, celebrated even at present for one of the first growths of Burgundy.*

† *Plin. Hist. Natur. lib. xv.*

‡ *Ibid. lib. xix.*

§ *See the agreeable Essays on Agriculture, by Mr. Harte, in which he has collected all that the ancients and moderns have said of Lucerne.*

At Northallerton, in Yorkshire, there is a Vine now (1789) growing, that once covered a space containing 137 square yards; and it is judged, that, if it had been permitted, when in its greatest vigour, to extend itself, it might have covered three or four times that area. The circumference of the trunk, or stem, a little above the surface of the ground, is three feet eleven inches. It is supposed to have been planted 150 years ago; but from its great age, and from an injudicious management, it is now, and has long been, in a very declining state.

There are many other Vines growing at Northallerton, which are remarkable for their size and vigour.

The soil is light and rich, of a dark colour, and inclining to sand.

In the King's garden at Hampton-Court, there is a Vine of the Black Hamburgh Grape now (1805) growing under, and occupying the whole of a glass-framed roof of an unusual extent. When I saw this magnificent Vine in 1788, the crop of grapes was only moderate, and the bunches, in general, very small. But since then I have from time to time been informed of its having often pro-

during winter multiplied the number of the flocks and herds, which, in their turn, contributed to the fertility of the soil."

The History of the Decline and Fall of the Roman Empire,
by Edward Gibbon, Esq. vol. i. chap. ii. page 52.

duced most abundant crops, and of large and well-perfected bunches.

At Valentine, near Ilford, in Essex, the seat of the late Sir Charles Raymond, Bart., there is a Vine now growing, whose branches extend and furnish the entire roof of a Pine-stove, which is seventy feet long by eighteen feet broad. And moreover, some of the branches are trained downwards, and also cover great part of the back wall of the said building. The Vine, which is the Black Ham-burgh, was planted in the year 1758, and grows entirely in the inside of the stove. The girth of the main stem, at two feet from the ground, is about thirteen inches.

The gardener informed me, that for some years past he, upon an average, has made about one hundred pounds per ann. of the produce of this tree. But at the time I saw it in the year 1788 (and just before the grapes were ripe), the crop was so very moderate, that had the whole been sold at the high price of five shillings per lb. it could not possibly have made a sum equal to half that amount. The bunches, however, in general were singularly fine, and composed of large and well-swelled berries.

This extensive Vine was exceedingly robust, and under a very judicious management. The worthy gardener that planted it has, from that time, had it entirely under his own care.

My esteemed and learned friend, the Rev. Mr. Philip Lawrents, head-master of the school

at Bury, in Suffolk, has favoured me with the following elegant and surprising account of a Vine now growing there :

January 6. 1786.

“ If credit may be given to our gardeners, the nature of our *Bury* soil is particularly favourable to the *gooseberry*, the *pear*, and the *Vine*. By all these, but especially by the produce of the *Vine*, my neighbour *Gervase Coe* is getting money very fast. One *Vine*, which he calls the *Black Cluster*, covers forty-four yards in length, of a wall ten feet high. Some of the branches have been suffered to run over the wall, and cover about twelve yards more in length on the other side. This extensive plant is about five or six and thirty years old. But this is no *datum* by which we must calculate the proportion of its annual growth ; for, during near half the time of its existence, it was, by its proximity to places unfit to receive its branches, confined within very narrow limits, and to judge from its progress within these last seven or eight years, it might, if it had been permitted, have covered three or four times the *area* of wall which it does at present.

“ That part of the wall against which this *Vine* was first trained has a south aspect. But three-fourths of the walling which it now covers face the east, and the twelve yards over the wall the west.

“ As no wine is ever made of the whole produce

of it, and indeed none except in very backward autumns, the owner cannot guess at the quantity of juice which it might yield. The clusters or bunches hang very thick, and each weighs from half a pound to a pound.

“ The public papers having lately taken notice of the prolific excellence of foreign Vines, numbering sometimes forty clusters on one shoot, I was tempted to examine my neighbour's Vine, and upon some vigorous shoots which had been left with nine or ten eyes or germs, to fill up vacant places, I reckoned above forty clusters. This will serve to give you some idea of this wonderful tree. At the height of one foot and a half from the ground, the trunk is only eight inches in circumference: below that pitch are some irregular protuberances, which it would be unfair to ground any calculations upon; however, not to keep back any thing which tends to information, the circumferences, where these protuberances are the fullest, I have measured, and find to be thirteen inches. From this swollen part issue some trifling shoots; and belonging to it are small stumps of other shoots, formerly cut down, which seem to have occasioned the irregularity here mentioned. Still lower, and within an inch or two of the ground, the stem girts but between nine or ten inches; finally, close to the ground are three or four divaricating branches of a very moderate size, which furnish the wall with somewhat more than a fourth of its foliage; so

that by the trunk girding eight inches, is meant the main trunk.

“ The Vine has been pruned some weeks : the number of eyes left upon this year’s shoots is various in proportion not only to the vigour of the shoot, but of the space also to be filled up. In most places, from three to five eyes is the general standard ; but there are many shoots with from eight to ten eyes left upon them ; and at the extremities of the Vine, as much of the wood as was perfectly ripe has been left. In this part you have shoots with eighteen, some with twenty-two eyes. Each of these (if one may judge from preceding years) will throw out a shoot, bearing upon an average of the shoots in the whole Vine two clusters and a half ; for the gardener assures me, that the clusters are from one to four on a shoot. Please to observe, likewise, that each shoot on that of the preceding year, which had numerous eyes left on, is not less prolific than the shoots of a smaller fraternity. Had the Vine been always pruned in this manner, and allowed to expand itself (as it has been suffered to do these three or four years past in particular), it is incredible what surface the main stem might have sufficed to cover.

“ The soil is a light, loose, brownish mould, lying about two feet thick on a loose sand, with coarse gravel, and at the depth of twenty feet you come to the water.”

ON

VINEYARDS.

BOOK IV.

A TREATISE on the Culture of the Vine would be incomplete and deficient, was I to omit giving some account of the formation and progress of a vineyard; and especially in a country of which a part is within the vinous latitude.^a

^a The vinous latitude is said to extend between the 25th and 51st degree in the northern hemisphere.

It is found, by experience, that all vineyards in *Germany* situated within the 51st degree are cultivated with great advantage; but beyond that limit their success is dubious.

I must here beg to remark, that the climate is various in different countries, even under the same parallel of latitude. Also, that the seasons are much more favourable in *Germany*, *Prussia*, *Poland*, *Hungary*, &c. than under the same latitude in the parallel parts of *America*. And, moreover, that the seasons in *Europe* were much colder formerly than at present. A celebrated author has thus accounted for this phænomenon.

“Some ingenious writers * have suspected that *Europe* was much colder formerly than it is at present; and the most ancient

* *In particular, Mr. Hume, the Abbé du Bos, and M. Pellon-tier, Hist. des Celtes, tom. i.*

Vineyards are of very ancient date, and wine is allowed to be the first fermented liquor known to man.^b

descriptions of the climate of Germany tend exceedingly to confirm their theory. The general complaints of intense frost and eternal winter are, perhaps, little to be regarded; since we have no method of reducing to the accurate standard of the thermometer the feelings or the expressions of an orator born in the happier regions of Greece or Asia. But I shall select two strong and incontestible proofs of a less equivocal nature.

“ 1st. The great rivers which covered the Roman provinces, the Rhine and the Danube, were frequently frozen over, and capable of supporting the most enormous weights. The barbarians, who often chose that severe season for their inroads, transported, without apprehension or danger, their numerous armies, their cavalry, and their heavy waggons, over a vast and solid bridge of ice.* Modern ages have not presented an instance of a like phenomenon.

“ 2d. The rein-deer, that useful animal, from whom the savage of the north derives the best comforts of his dreary life, is of a constitution that supports, and even requires, the most intense cold. He is found on the rock of Spitzberg, within ten degrees of the Pole. He seems to delight in the snows of Lapland and Siberia; but at present he cannot subsist, much

* *Diodorus Siculus*, lib. v. p. 349. *Edit. Wessel. Herodian*, lib. vi. p. 221. *Jornandes*, chap. 55. *On the banks of the Danube, the wine, when brought to table, was frequently frozen into great lumps, frusta vini. Ovid. Epist. ex Ponto*, lib. iv. 7. 9, 10. *Virgil. Georgic.* lib. iii. 355. *The fact is confirmed by a soldier and a philosopher, who had experienced the intense cold of Thrace. See Xenophon, Anabasis*, lib. vii. p. 560. *Edit. Hutchinson.*

It has been much disputed of late, whether the various places in the different counties in England,

less multiply, in any country to the south of the Baltic.* In the time of Cæsar, the rein-deer, as well as the elk and the wild bull, was a native of the Hercynian forest, which then overshadowed a great part of *Germany* and *Poland*.† The modern improvements sufficiently explain the causes of the diminution of the cold. These immense woods have been gradually cleared, which intercepted from the earth the rays of the sun.‡ The morasses have been drained; and, in proportion as the soil has been cultivated, the air has become more temperate. *Canada*, at this day, is an exact picture of ancient Germany; although situated in the same parallel with the finest provinces of France and England, that country experiences the most rigorous cold. The rein-deer are very numerous, the ground is covered with deep and lasting snow, and the great river of *St. Lawrence* is regularly frozen, in a season when the waters of the *Seine* and the *Thames* are perfectly free from ice.§ ||

‡ “ From the most early ages wine is mentioned by the *historians* and poets, and seems to be almost coeval with the first productions from vegetables: the grapes became, at first, a useful part of their aliment, and the recent expressed juices a cooling drink. These, by a spontaneous fermentation, soon

* *Buffon Histoire Naturelle*, tom. xii. p. 79. 116.

† *Cæsar de Bell. Gallic.* vi. 23. *The most inquisitive of the Germans were ignorant of its utmost limits, although some of them had travelled in it more than sixty days' journey.*

‡ *Cluverius (Germania Antiqua, lib. iii. chap. 47.) investigates the small and scattered remains of the Hercynian wood.*

§ *Charlevoix Histoire du Canada.*

|| *History of the Decline and Fall of the Roman Empire*, by Edward Gibbon, Esq. vol. i. chap. ix. p. 218.

which still retain the name of vineyards, were plantations of Vines, for the purpose of making wine.^c

acquiring a vinous quality, supplied them with a more grateful liquor, which strengthened and exhilarated their spirits after labour.

“The *Indians*, in the same manner, discovered similar virtues in the *palm-trees*; they first made incisions in the bark, with a view of drinking the cooling liquor which distilled from them; but soon found that, by being kept in vessels, it acquired different and more agreeable qualities.

“In these times they certainly drank their wine recent and pure, soon after the fermentation had ceased; but observing, that by acquiring a greater age, it became more generous, they, with art and industry, endeavoured to prepare and preserve it for *future* use. This, probably, was the first origin and progress of wine: it is mentioned that *Noah* first planted the Vine; and that wine was offered with *bread* by the *Patriarch Melchisedech*, amongst his *first fruits*, as a well-pleasing *sacrifice* to *God*.

“The *poets*, who were inspired by it, celebrate its praise; and, not satisfied with allowing it to be a most useful *human* invention, ascribe it to the *gods*, to *Osyris*, *Saturn*, and *Bacchus*, and call it their ambrosial nectar.

“The greatest *philosophers*, *legislators*, and *physicians*, give it due praises, when temperately taken; and *Plato*, who strictly restrains the use of it, and severely censures the excess, says, that nothing more excellent or valuable than *wine* was ever granted by *God* to mankind.” — *Barry's Observations, &c. on Wines*, p. 27.

^c The debate arose from a Memoir of the Rev. Samuel Pegge, in the first volume of the *Archæologia*, of the Society of Antiquaries, London, on the introduction, progress, state, and condition of the Vine in Britain. The Honourable Daines Barrington, in his *Observations on the more ancient Statutes*, p. 207,

As I have not the least pretension to antiquarian knowledge, it would ill become me to endeavour to

was pleased to combat Mr. Pegge's notions, and to declare, that he takes the English vineyards "either to have been *orchards*, with Sir Robert Atkins, or rather, according to his own particular sentiments, *currant-gardens* : in short, any thing else but true and proper vineyards." To these remarks of Mr. Barrington, Mr. Pegge replied in a second Memoir, in the third volume of the *Archæologia*, with which Mr. Barrington not being satisfied, he gave in a paper on the subject in the same volume, to consider and answer Mr. Pegge's Observations; and so the matter then rested. Mr. Pegge, however, has since informed me, by letter, that Dr. *Stukeley*, in *Itin.* p. 48, speaks of a *vineyard* near Chipping-Norton; *William Thorne*, col. 2036, of another in *Kent*; and that *Madox*, in his *Hist. of the Exchequer*, i. p. 364, writes, that the sheriffs of *Northamptonshire* and *Leicestershire* were allowed, in their account, "for the livery of the king's *Vine-dresser* at *Rockingham*, and for necessaries for the vineyard." He further adds, that the late dean of *Ely*, Dr. Thomas, imparted to him the following extracts from the archives of that church :

	£	s.	d.
Exitus Vineti - - - - -	2	15	3¼
Ditto, Vineæ - - - - -	10	12	2½
Ten bushels of grapes from the vineyard -	0	7	6
Seven Dolia Musti from the Vineyard, 12 Ed. II.	15	1	0
Wine sold for - - - - -	1	12	0
Verjuice - - - - -	1	7	0
One Dolium, and one pipe filled with new } wine, and supposed at Ely - - - }			
For wine out of this vineyard - - -	1	2	2
For verjuice from thence - - -	0	16	0
No wine, but verjuice made 9 Ed. IV.			

It appears plainly, says Mr. Pegge, from these extracts, first, that, in the latitude of *Ely*, grapes would sometimes ripen, and

enter into this debate; and, indeed, it may seem sufficient to observe, that good wines are constantly made in a part of Germany, which is under the same parallel of latitude with many counties in the southern part of England; and that, where the situation and soil are proper for Vines, the lands cannot possibly be more beneficially employed than by being converted into vineyards.^d

the convent made wine of them, and sometimes not, and then they converted them into verjuice, just as it is in Derbyshire, where grapes, growing on the South wall of an house, will, in a hot summer, come to maturity, and be very good; but, in a very wet or cold season, will never be fit for the table. Secondly, that these passages all taken together, it is impossible to understand them of any thing else than a true or proper vineyard, as they never can be interpreted either of an *apple-orchard* or a *currant-garden*.

Those who wish to go further into this matter may consult the Gentleman's Magazine, 1775, p. 513, and 1786, p. 918; also Archæologia Soc. Antiq. London, 5, p. 309.

^d "I was particularly attentive to inquire of him * what were the usual produce of a good acre of Vines, and the account he gave was this:—The vineyard of twenty-six acres, of which he had the care, yielded five years ago a produce, per acre, of four pieces, each piece twenty-eight gallons, which sold as follows:

	£	s.	d.
Two pieces at eleven guineas †	23	2	0
One piece at 8l.	8	0	0
One piece at 4l. 10s.	4	10	0
	35	12	0

* *The Vigneron.*

† *This is 8s. a gallon.*

In this pursuit there are four things which ought materially to be considered, viz.

1st. the situation; 2dly, the soil; 3dly, the kinds of Vines which are the most fitting to be planted; and, 4thly, the mode of their management.

First. An elevated situation, where there is a gentle declivity to the south or south-east, is esteemed preferable to low grounds, which are generally subject to damps and spring frosts, even at times when the adjoining high grounds are entirely free from both.

A vineyard should be well sheltered to the north, as also to the N. W. and N. E. In an hilly country there are generally many favourable

The next year's produce was,

	£	s.	d.
Two pieces at 12l. - - - - - -	24	0	0
Two pieces at 9l. - - - - - -	18	0	0
One piece - - - - - -	5	0	0
	<hr/>	<hr/>	<hr/>
	47	0	0

“ In general, the produce varies between 30 and 50l. In some favourable spots, highly managed, and in a good season, a produce of from 60 to 70l. an acre has been known.

“ As to the expenses, they are not so easily calculated; for I could not get him to be explicit, nor did I clearly understand all his terms.”

Travels through France and Spain in the years 1770 and 1771, by Joseph Marshall, Esq. vol. 4. p. 92.

spots where nature has given important advantages, and these should be still further improved by art.

Plantations of forest trees, judiciously formed, would contribute much to give warmth and shelter; but these should not be placed too near the Vineyard, so as to confine the air, which would prove very prejudicial.

We are informed that, in wine countries, vineyards are not only confined to gentle declivities, but that they often are formed on slopes on the sides of hills and rocks, which are sometimes so steep as even to border upon precipices: and that vineyards, thus situated, produce grapes uncommonly rich, yielding wines of the most excellent quality.^e

I am informed, too, that the hills in the counties bordering upon the English channel, have, in general, declivities tending to the south^f: a cir-

^e In the neighbourhood of *Piera*, there is an eminent hill, the southern side of which is so steep, that people are obliged to lay hold of ropes fixed to strong poles, in order to keep themselves upright, while they stalk from Vine to Vine, to pluck the grapes that cover all that side. Should they trust themselves there without the help of those ropes, the least remissness of attention in stepping might cause a very mischievous tumble. I wonder how people could take it into their heads to plant Vines on so inconvenient a spot: but the trouble of the vintagers, is very well repaid by the goodness of those grapes, which yield the most excellent wine that is drank in Catalonia." — *Baretti's Travels*, vol. 4. p. 72.

^f It is a general and received opinion, that this island was originally united with, and formed a part of, the continent.

cumstance of the greatest importance respecting the plantation of Vineyards.

Secondly. As I have, in the former part of this work, taken notice of the soil proper for Vines, it may seem unnecessary here to enlarge upon that head. I shall, however, just observe, that the Vine delights in such gravelly and rocky soils as we frequently find on the sides of steep hills and rocks : and that it has sometimes been known to flourish among mere stones and gravel. ^s

The similarity of the different strata, which, it is said, form the land on both sides of the British channel, serves to confirm us in this belief.

Moreover, on the south coast of England the rocks have a southern aspect ; but on the opposite coast of France, I am told, they incline to the north. From thence it is reasonable to conclude, that at the deluge the horizontal stratum (or isthmus) was broken between these countries, and the bed or middle of the channel falling lowest, the sea naturally flowed into it, and formed what is now called the *British Channel*.

^s “ Concerning the soil proper for Vines, I shall give the first hint from that ingenious and candid piece of Mr. Lawrence’s, where, with so much good reason, he tells us, that he cannot easily be brought to think that any soil or situation can be too dry for the roots of the *Vine*, after having seen at *Barnwall*, near *Oundle*, in *Northamptonshire*, a flourishing *Vine* grow from between the joints of an old castle wall, near twenty feet high from the ground, which, he was told, produced admirable grapes when it was well managed.” *New Improvements of Planting and Gardening*, by Richard Bradley, F. R. S. p. 187.

To the above, the following account from a celebrated author may be added :

Hence it will appear that the introduction of vineyards into this country would have no bad effect respecting agriculture, because all strong and deep lands which are best adapted for tillage, are the most unsuitable for vines.

Permit me to add, that, besides gentle declivities and light soils, such as are proper for vineyards^h, Vines grow in situations and soils where the lands could hardly be rendered profitable any other way. And thus, though the Vines would not grow robust on steeps of poor gravelly and rocky soils, still they would be more prolific than Vines planted on

“ At Malaga, the great mart of wine and fruit, the north and east approach is hemmed in by mountains; these present, from the town, a most barren and unpromising prospect, their tops being immensely high. It is in these iron-looking mountains, and among these peeled (i. e. bald) rocks, *where there is no appearance of soil or earth*, that grow annually so many thousand ton of exquisite wine, and astonishing quantity of Moscatel raisins.” *Carter’s Journey from Gibraltar to Malaga*, 11. p. 387.

^h Although it be not difficult to determine what soil is properly adapted to promote the growth of the Vine from its external appearance, yet there is something in respect of its *nature*, so deeply hidden from us and unknown, as not to be developed but by the quality of the wine.

I have been informed, that the rich *Hungarian* wine, so universally esteemed for its peculiar flavour, is made only in a very small district near *Tokay*; and that the adjoining vineyards, where both soil and situation are apparently the same, and although planted with the same kind of grape, produce a wine not only much inferior in its quality and excellence, but also very dissimilar in its colour and appearance.

rich lands, and the fruit would be greatly preferable.

Thirdly. The success of a vineyard in this country would most essentially depend on the kind of vines there propagated.

I believe it has been a prevailing, but surely an erroneous notion, that the sweet early kinds of grapes are the best to plant for the purpose of making wine in this country. And that most or all of the modern trials have been made from Vines brought from *France*.

Among the abundant variety of grapesⁱ I doubt not but there are peculiar sorts, which are by nature singularly adapted to make wines in different climates.

Thus, the sorts of grapes propagated in the *Madeira* and *Canara* islands might not be found, if tried, to make good wines in *France*.

Hence, as the southern part of this island is almost on the verge of the vinous latitude, it should seem reasonable to suppose, that there would be the greatest probability of success from those kinds of grapes which have been known to thrive and prosper best in the most northern latitudes. I should, therefore, recommend the kinds of Vines cultivated in *Germany*; and particularly the sort producing the grapes of which

ⁱ Mr. *Swinburne* observes there are forty sorts of grapes in the diocese of *Syracuse*.

Swinburne's Travels in Sicily, 11. p. 342.

the *Rhenish* wine is made, in preference to any kind cultivated in *France*.

I have remarked above, that the early sweet kinds of grapes are improper for making wine in this country: my reason is, that though such grapes yield a sweet juice, it is not calculated to undergo fermentation.

It is found, by experience, that good-bodied, or generous wines, can be made from grapes of an austere taste, and that, too, even before they are quite arrived at a state of maturity. But then wine, from such crude grapes, requires to be kept to a good age.^k

The case is similar with respect to apples. It is well known that the sweet kinds of apples which

^k “ But that we may answer every objection that may be made against planting *Vineyards* in *England*, give me leave to recite what I have heard relating to making of liquors with unripe and sour fruits. In *Devonshire* a gentleman made a vessel of *verjuice*, of *crab*, or wilding apples, which being placed in his cellar among other liquors, was not used till about three or four years afterwards, and was then found to be so palatable and exceeding pleasant, that he now prefers the liquor made of such wilding sour fruit (after it has had time to digest) to any *cyder* of that country. So I have known *verjuice* made of half-ripe grapes, that after two or three years keeping in a vessel, has become delicate wine; and the *Rhenish* wines, when they are newly made, are so sour, that they are not fit to drink; but after several years’ standing, afford us that incomparable liquor which is called *Old Hock*; and, on the contrary, sweeter liquors are apt to turn sour by keeping.” — *New Improvements in Gardening*, by Richard Bradley, F.R.S. p. 177.

ripen in the summer months, are very unfit for the making of cyder. And that the noblest cyder (such as the *Styre* and *Cockagee*) is made from apples not much better than wildings.

Fourthly. I shall not undertake here to give general directions for the management of a vineyard; the method of raising Vine-plants, and the common process of a vineyard, as practised abroad, having been already delivered to the public by much abler pens. However, I shall beg leave to offer a few ideas on the subject, and particularly on the mode of training the Vines.

As even the most southern parts of this island are (as I have observed) but nearly on the verge of the vinous latitude, every possible advantage should be consulted respecting the formation and management of a vineyard here.

The vineyards abroad are formed by planting the Vines in rows, and by training them in a perpendicular direction. But in this country I should greatly prefer the mode of training the Vines in a lateral or horizontal form, similar to the method practised in *Holland*, with Vines in frames, as I have already hinted, p. 110. and 136. There would be little difficulty in this method, as the Vines would readily be trained along small poles, not thicker than those used for hops: these should be fixed nearly parallel to the ground. Vines thus trained would derive, I apprehend, many advantages, not only by means of warmth and shelter, but that they would most easily also

be protected from spring frosts, by applying the boughs of trees, particularly evergreens. The grapes also, let me observe, would be greatly benefited by the reflection of the soil underneath.

When Vines are intended to be planted on the steeps of hills, and on the sides of rocks, the ground should be prepared and formed in the manner of steps, as in plate v.

The Vines should be planted near the angle a , and trained by stakes upwards, from a towards b .

It will be absolutely necessary that the ground should be lower at the angular point a , of every step, than at b ; for without this care, the Vine-plants would lose the advantage of such rains as fall hastily and perpendicularly.

It is easy to conceive what advantage Vines would gain from a situation thus planned, since the back from a to b would be nearly equal to a wall.

The expense attending the formation of the ground cannot be very considerable. The work should be begun at the top, and the soil taken out should be thrown down the hill.

I should have observed, that it would be further beneficial to have a little good soil put in at the angles before the Vines are planted: and also, that all hills of a southern aspect, and composed of either slate, gravel, scaly rock, or limestone, are very proper to be planted with Vines.

In a dissertation on the growth of wine in

England, by F. X. VISPRE, printed at Bath, 1786, the ingenious author informs the public, "That in September, 1782, he hired a piece of ground at *Wimbledon*; that in March, 1783, he planted it with Vines; that his intention was then to train the shoots of them (as he has since done at *Chelsea*) upon the ground in their natural positions, like the Vines of melons and cucumbers; and that he hopes to make good wine with well-ripened grapes, almost every year."

Mr. *Vispré* does not arrogantly assume the invention of this method to himself, but very candidly acknowledges that he pursued and practised it in consequence of the following hint from that great and sagacious philosopher Lord Chancellor BACON: "The lowness of the fruit-boughs makes the fruit greater, and causes it to ripen better; for we always see in apricots, peaches, and mello-cottons upon a wall, the largest fruit is towards the bottom; and in France, the grapes that make the wine, grow upon low Vines bound to small stakes, while the raised Vines in arbours make verjuice."

He adds, "It is reported, that in some places Vines are suffered to grow like herbs, spreading upon the ground, and the grapes of these Vines are very large; it were proper to try whether plants usually sustained by props, will not bear large leaves and fruit, if laid along the ground, as hops, ivy, woodbine," &c.

This last citation, says Mr. *Vispré*, from the

works of the Chancellor, shows very clearly that the Rev. Mr. LE BROcq is under a mistake, when, in his description of the methods of planting and training all kinds of fruit-trees, Vines, &c. (for which his Majesty's Letters Patent have been granted to him,) he says, p. 4. " I sincerely request they will accompany me in my illustration of my new methods of horticulture and fructification."

This method, according to the description, is, to train all sorts of fruit-trees or Vines upon or near the ground. Says Mr. Vispré, " I do not know whether the above method, suggested by Lord Chancellor BACON, was tried by any person before myself; but I believe Mr. LE BROcq less entitled to call it his, than I am to call it mine, since I have practised it with success these two last summers.¹ I never dreamt of monopolizing that method; I was sufficiently satisfied with the prospect of being the restorer of Vineyards in this country: but that I might not lose the honour of being deemed such, in May, 1784, I presented to the Society for the encouragement of Arts, &c. a plan adapted to this climate, for cultivating Vineyards; and afterwards left open my Vineyard to the inspection of the curious.

" The laying the plants in the ground every year,

¹ Fruit-trees of various sorts have been trained in the above described horizontal form in the gardens at Welbeck more than fourteen years.

and training the shoots upon it, was in that plan the first article. At the end of the year I gave an account of the first experiment to Mr. More, secretary to the society.

“ I have done the same lately of the second year. This last season having proved more favourable than the preceding one, and the shoots of the Vines having been laid for the second time, the grapes were considerably larger than those of the same kind growing on a south wall, and ripened as I said before.”

Mr. *Vispré* produces many instances of wine having been made in various parts of England; some of which I shall here beg leave to transcribe.

“ Mr. BRADLEY, Professor of Botany in Cambridge, in his *Dictionarium Botanicum*, art. *Vitis*, says, ‘ I cannot help mentioning how our poor soils might be improved by making of Vineyards; a good instance of which is at Mr. JOHN WARNER’S, a gentleman of Rotherhithe, near Southwark, who makes good wine from his own Vineyards.’ ”

“ STEPHEN SWITZER, in vol. ii. p. 226, of his *Ichnographia Rustica*, published in 1742, says, that Vineyards may be so cultivated in England, as to produce large quantities of grapes, and those so well ripened, as to afford a good and substantial vinous juice, needs no demonstration; when in several parts of *Somersetshire* there are, at this time, flourishing Vineyards, and the Vineyard of the late Sir WILLIAM BASSET, in that county, has annually produced some hogsheads of good-bodied

and palatable wine, which I have been credibly informed by gentlemen who have drank considerable quantities of it with the greatest satisfaction.”

“ BARTHOLOMEW ROCQUE, a gardener at Walham Green, made wine for thirty years from a Vineyard he had planted in a common field garden; and although the ground was flat, the wine was as good as that of *Orleans* or *Auxerre*, in the judgment of some acquaintance of mine still alive.”

“ Dr. Hales, in vol. iv. of his *Complete Treatise on Practical Husbandry*, written equally for the service of the farmer and country gentleman, says, p. 2, ‘ This we can say with certainty, that very good wine may be made in England, and that in many parts of the kingdom there are pieces of land which may be turned to some account this way, at a small expense; and others, which will answer to a more chargeable preparation, in such a manner as to make the farmer very happy.’ ”

And again, he says, in p. 11, “ I have drank with the distinguished and eminent Dr. Shaw, wines made under his own care, from a little Vineyard behind his garden at Kensington, which equalled many of the lighter wines of France; and while due care was taken of the Vineyard at Hammersmith, a great deal of very good wine was obtained there for sale, yet neither of these were favourable spots.”

“ The Bath Vineyards might serve as a better example for the husbandman, who should consider only profit from them; the juice of the grapes was

sold there as it was pressed from the fruit, and the owners had no further care than managing the ground and gathering.

“ In one of these instances there was excellent wine made for the table; in the other, a profitable kind for sale; and, in the third, no more trouble was allowed to this than the farmer usually afforded to his slighter products; yet they all answered, when well conducted. The two last might have been better managed, and their profit rendered three-fold. *We speak of what we know with certainty, having seen and examined them all.*

“ I have known,” says Mr. Hanbury, “ good wine made of grapes growing in England, and have drank our *Burgundy* no way inferior, as my taste could find out, to that noted wine which we have constantly imported from that country. Doubtless, therefore, there are some soils and situations that will suit Vines, and cause their fruit to ripen properly here. When a person is possessed of such a spot, then may he proceed to plant it as a Vineyard, otherwise he will find his labour and expense thrown away.” — *Complete Body of Gardening*, vol. ii. p. 783.

As modern instances impress the mind more forcibly than such as are more ancient, I have reserved the account of the success of the Vineyard at *Pain's-hill*, for my last and most convincing illustration. It is thus elegantly introduced by Sir *Edward Barry*, in his celebrated Treatise on Wines, p. 468.

“ From the history of the ancient and modern wines, we may be capable of forming a more true judgment of the various nature and qualities of wines, which, in the general, are chiefly owing to the *climate* and *soil*. It is very remarkable that the grapes of all Vines, planted within the *fifty-first degree* of the *northern latitude*, acquire such a degree of strength, as renders them fit for producing good wine, in which the *terrene and saline* principles prevail, though they are more refined and corrected as they advance to maturity; but as the climate advances more to the south, they acquire more strength, and the *oleaginous* and *spirituous* principles prevail, and in any considerable *quantity* cannot be *salutary* without being diluted with water; on which account the wines produced in temperately warm climates, where the principles are more *equally blended* and *united*, are more light, and though generous, more salutary, and agreeably adapted to promote social happiness, than those produced in either *extreme*: such are particularly the *French*, Hungarian, Italian, and some of the *Spanish* and *German* wines.

“ It is a just observation, that one half of *Germany*, which is to the north of the vinous latitude, is entirely destitute of any good wine, while the other half abounds with fertile Vineyards, and a variety of good wines; and likewise shows, that a very moderate addition to the warmth of the climate is sufficient to produce excellent wines; in which the *soil* principally, with other circum-

stances, has at least an equal influence with the warmth of the climate, and in some instances a greater, in giving the peculiar grateful qualities, for which some wines are distinguished. Of this several instances are known, where not only the same climate, but in places very near adjacent, from the same Vines, and in the same situation, and aspect to the sun, very different wines are produced, which can be only owing to the *soil*.

“ From hence it is evident, that good wines may be made in several parts of *England*, which are within this vinous latitude.

“ The ingenious Mr. Miller shows, from ancient records, that in many parts of *England*, and particularly near *abbeyes* and *monasteries*, good wines were made, and that these places are still distinguished with the name of Vineyards; but how they were rooted up and neglected, there are no clear accounts left. He likewise observes, that an obstinate prejudice has prevailed against making any farther trials, from some improper ones made near *London*, where the *soil* is not *friendly* to the *Vines*, and where the wines were so injudiciously made, that under the same disadvantages neither those of *Italy* or *France* would have succeeded. He, therefore, with his usual modesty and candour, gives his opinion, founded on some trials, which he had seen made, and the instructions he had received from several persons abroad, who cultivated Vineyards for their own use, and that of their friends, and who have been very exact in observ-

ing the several methods of practice among the Vignerons of those countries; from whence he hopes, that the prejudice which still prevails against any project of this kind might be removed, or at least suspended, until some farther trials shall have been more judiciously made, which he thence proceeds to direct. But had he been acquainted with the success which attended the Vineyards of my ingenious friend, the Hon. *Charles Hamilton*, who has been long distinguished for his peculiar elegant taste, he would have spoken with more certainty. To him I am particularly obliged for the following exact description, which he has, at my request, given of the rules he had pursued, and which he has given me leave to publish.

“ ‘ The Vineyard at Pain’s-Hill is situated
 ‘ on the south side of a gentle hill, the soil a
 ‘ gravelly sand; it is planted entirely with two
 ‘ sorts of *Burgundy* grapes, the *Auvernat*, which is
 ‘ the most delicate, but the tenderest; and the
 ‘ Miller grape, commonly called the *Black Cluster*,
 ‘ which is more hardy. The first year I attempted
 ‘ to make red wine in the usual way, by treading
 ‘ the grapes, then letting them ferment in a vat, till
 ‘ all the husks and impurities formed a thick crust
 ‘ at the top, the boiling ceased, and the clear wine
 ‘ was drawn off from the bottom.

“ ‘ This essay did not answer; the wine was
 ‘ so very harsh and austere, that I despaired of
 ‘ ever making red wine fit to drink; but through
 ‘ that harshness I perceived a flavour something

‘ like that of some small *French* white wines,
‘ which made me hope I should succeed better with
‘ white wine. That experiment succeeded far be-
‘ yond my most sanguine expectations; for the
‘ very first year I made white wine, it nearly
‘ resembled the flavour of *Champaign*; and in two
‘ or three years more, as the Vines grew stronger,
‘ to my great amazement my wine had a finer
‘ flavour than the best *Champaign* I ever tasted.
‘ The first running was as clear as spirits; the
‘ second running was *œil de Perdrix*, and both
‘ of them sparkled and creamed in the glass like
‘ *Champaign*. It would be endless to mention
‘ how many good judges of wine were deceived
‘ by my wine, and thought it superior to any
‘ *Champaign* they ever drank; but such is the
‘ prejudice of most people against any thing of
‘ *English* growth, I generally found it most pru-
‘ dent not to declare where it grew, till after they
‘ had passed their verdict upon it. The surest
‘ proof I can give of its excellence is, that I have
‘ sold it to wine-merchants for fifty guineas a
‘ hogshead; and one wine-merchant, to whom I
‘ sold five hundred pounds’ worth at one time,
‘ assured me, he sold some of the best of it from
‘ 7s. 6d. to 10s. 6d. per bottle.

“ ‘ After many years’ experience, the best
‘ method I found of making and managing it was
‘ this: I let the grapes hang till they had got all
‘ the maturity the season would give them; then
‘ they were carefully cut off with scissars, and

‘ brought home to the wine-barn, in small quantities, to prevent their heating, or pressing one another ; then they were all picked off the stalks, and all the mouldy, or green ones were discarded before they were put upon the press ; where they were all pressed in a few hours after they were gathered : much would run from them, before the press squeezed them, from their own weight one upon another. This running was as clear as water, and sweet as syrup ; and all this of the first pressing, and part of the second continued white ; the other pressings grew reddish, and were not mixed with the best. As fast as the wine ran from the press into a large receiver, it was put into the hogsheads, and closely bunged up. In a few hours one would hear the fermentation begin, which would soon burst the casks, if not guarded against, by hooping them strongly with iron, and securing them in strong wooden frames, and the heads with wedges. In the height of fermentation, I have frequently seen the wine oozing through the pores of the staves.

“ ‘ These hogsheads were left all the depth of winter in the cool barn, to reap the benefit of the frosts, when the fermentation was over, which was easily discovered by the cessation of noise and oozing ; but to be more certain, by pegging the cask, when it would be quite clear ; then it was racked off into clean hogsheads, and carried to the vaults, before any warmth of

‘ weather could raise a second fermentation. In
‘ *March*, the hogsheads were examined ; if any
‘ were not quite fine, they were fined down with
‘ common fish glue, in the usual manner ; those
‘ that were fine of themselves were not fined down,
‘ and all were bottled about the end of *March* ;
‘ and in about six weeks more would be in per-
‘ fect order for drinking, and would be in their
‘ prime for above one year ; but the second year
‘ the flavour and sweetness would abate, and
‘ would gradually decline, till at last it lost all
‘ flavour and sweetness ; and some that I kept
‘ sixteen years became so like *Old Hock*, that it
‘ might pass for such to one who was not a per-
‘ fect connoisseur.

“ ‘ The only art I ever used to it, was putting
‘ three pounds of white sugar-candy to some of
‘ the hogsheads, when the wine was first tunned
‘ from the press, in order to conform to a rage
‘ that prevailed, to drink none but very sweet
‘ *Champaign*.

“ ‘ I am convinced much good wine might be
‘ made in many parts of the south of England.
‘ Many parts are south of Pain’s-Hill ; many
‘ soils may be yet fitter for it, and many situ-
‘ ations must be so ; for mine was much exposed
‘ to the south-west wind, (the worst of all for
‘ Vines,) and the declivity was rather too steep ;
‘ yet with these disadvantages it succeeded many
‘ years. Indeed, the uncertainty of our climate
‘ is against it, and many fine crops have been

‘ spoiled by *May* frosts and wet summers ; but one
‘ good year balances many disappointments.’ ”

“ There are not wanting in this country several gentlemen of fortune, who make the improvements in agriculture their favourite study and practice. To such, no experiments could give a more rational and elegant amusement than planting and cultivating a small Vineyard in a favourable situation : nor could the fruits of any other plantation afford that cheerful pleasure, which they would receive from drinking fine wines of their own production. The prospect of some success, even from the first trial, seems almost certain if conducted by the rules given by Mr. *Hamilton* and Miller, with the necessary assistance of a good Vignerons, well versed in the mechanic operations of this process. Neither is it improbable, but that in some time several Vineyards may be propagated, on account of the *profit* arising from them, and this country supplied with native wines, very superior to many of those which are now imported.”

From the foregoing accounts, it is evident that good wine may be made in this country in a propitious season : and it is also certain, that formerly there have been Vineyards in many parts of this kingdom, particularly near abbeys and monasteries. This plainly appears by the lands in various places still retaining the name of Vineyards : but antiquaries are silent as to the reasons of their being rooted up and neglected.

INDEX

TO THE

TREATISE ON THE VINE.

A	Page
ACARUS, or Red Spider, often infest and greatly injure Vines - - - -	170
— frequently attack the leaves of the Vine early in the summer - - - -	171
— how to destroy - - - -	175
Age and Stature of the Vine - - - -	177
Air is to be found in every portion of earth -	153. n.
— ascends with the sap of the Vine in the bleeding season - - - -	ib.
Aleppo Grape, description of - - - -	16
Annual produce of an acre of good Vines will sometimes yield profit equal to 70l. - -	-197. n.
Antiquity of the Vinèyards in Burgundy -	-185. n.
— in England - - - -	-194. n.
Aphides, supposed to be the most numerous of all the insect tribe - - - -	172
— sometimes infest the Vine as well as plants in general - - - -	172, 173
— how to destroy - - - -	173
Apple, a native of Italy - - - -	-184. n.
Artificial dew, its great use in a hot-house at the time of Vines flowering, and how to raise - -	94
Attraction of plants to the sun, a dissertation on -	75

B

Barnwall, account of a flourishing Vine there, growing from between the joints of an old castle wall	
• near twenty feet high from the ground -	199. n.

	Page
Barry, Sir Edward, his curious note on the origin of wine - - - - -	193. <i>n.</i>
Bath, Vineyards at, from which excellent wine was made - - - - -	208
Beef, in some parts of Italy, has, at a certain season, a strong and disagreeable flavour of Bergamot -	97. <i>n.</i>
Black Damascus Grape, description of - - - - -	15
Black Frontinac Grape, description of - - - - -	18
Black Grape from Tripoli, description of - - - - -	15
Black Grape from Palestine, description of - - - - -	28
Black Hamburgh Grape, description of - - - - -	20
Black Lisbon Grape, description of - - - - -	29
Black Muscadel Grape, description of - - - - -	17
Black Muscadine Grape, description of - - - - -	23
Black Raisin Grape, description of - - - - -	26
Black Sweetwater Grape, description of - - - - -	20
Black Spanish, or Alicante Grape, description of -	22
Bleeding of Vines, observations on - - - - -	148, 149
Blue Frontinac Grape, description of - - - - -	19
Border in the Vinery should not be crowded with plants - - - - -	132
Brick Grape, description of - - - - -	22
British Channel, conjectures respecting its formation -	199. <i>n.</i>
Bunch of Grapes produced at Welbeck in the year 1781, that weighed 19½ lb. - - - - -	52. <i>n.</i>
----- at the Madeiras sometimes weigh 6lb. and upwards - - - - -	96. <i>n.</i>
Burgundy, antiquity of the Vineyards there - - - - -	185. <i>n.</i>
Bury, in Suffolk, account of an extensive Vine growing there - - - - -	188

C

Carter, Mr. his superb account of the beautiful appearance of grapes and other fruits in Spain -	84. <i>n.</i>
Catalonia, surprising instance of the prolific excellence of the Vineyards there - - - - -	179. <i>n.</i>
Cat's Grape, description of - - - - -	26
Chasselas Grape, description of - - - - -	23

	Page
Claret Grape, description of - - - - -	24
Cluster of Grapes, an enormous one brought by the twelve spies from the land of Canaan, an ac- count of - - - - -	53. n.
Coccus Adonidum, a species of insect, sometimes mis- taken for the crimson-tinged Pine-bug -	173
Cockagee Cyder, made of a kind of wilding apple -	203
Compost-mould proper for Vines, how to prepare -	35
Cornichon Grape, description of - - - - -	30
Critical season proper for sowing spring corn and grass- seeds, how to be observed, and its vast im- portance - - - - -	58. n.
Curious experiments by engrafting, made by a father at the Carthusians at Bologna - - -	165. n.
Cutting of a Vine, the particulars necessary to form; described - - - - -	68
————— how to manage the winter before plant- ing - - - - -	69, &c.

D

Damson Grape, description of - - - - -	28
Dead branches of the oak and other forest-trees, when they stand inclining to a perpendicular direc- tion, ought not to be cut off close to, or even with, the bole of the tree - - - - -	69. n.
————— dissertation on - - - - -	ib.
Doors of the cathedral at <i>Ravenna</i> , made of Vine-tree plank 12 feet long and 15 inches broad -	181
Drainage of Dunghills may be considered as the cream or essence of manure - - - - -	159. n.
————— in moat farm-yards this valuable liquor is generally permitted to run to waste -	ib.
—————, how to be made to serve as a manure - - - - -	160. n.
Durability of vitiginous wood - - - - -	182
Dust and scrapings of roads, its vast use in promoting vegetation - - - - -	44
Dunging Vineyards (in France) explained -	120. n.

E

Early Black July Grape, description of	- - -	26
Early kinds of grapes are improper for the purpose of making wine in this country	- - -	201
Early-set fruit often falls off in a cold season, and why	-	152. n.
Early white Grape from Teneriffe, description of	-	28
Ely, extracts from the archives of that church, respecting the produce of an ancient Vineyard there	-	195. n.
Europe experienced much colder seasons formerly than at the present. This phenomenon accounted for	- - - - -	191, 192.
Experiments by engrafting Vines, curious accounts of	-	164. n.
Eyes of Vines growing in Pine-stoves, often push irregular	-	90
Eyes of Vines, how to make push more generally	-	ib.

F

Fall of the leaf in Vines, a good criterion for the season of pruning them	- - - - -	89
<i>Farina</i> of the Grapes of the vineyard, observation on	-	59
Farmers ought to fix upon the spring seed-time from observations	- - - - -	58. n.
Festoon Vineyards in <i>Catalonia</i> and <i>Lombardy</i> , their great elegance and surprising beauty	-	179. n.
Fig-trees afford two crops of fruit annually in some parts of Italy	- - - - -	97. n.
——— in a fruit-bearing state at Lambeth Palace, thought coeval with Archbishop Laud	-	180, 181.
Flax, the cultivation of, was transported from Egypt to Gaul	- - - - -	185. n.
Flowers, herbs, and fruits, that grow in our European gardens are mostly of foreign extraction	-	184. n.
Flowers of the Vine impart an agreeable scent	-	125. n.
——— a practice of the ancients in putting them into wine to give it spirit	-	125, 126. n.
Forest-trees, how to prevent the decay of	- - -	69. n.
Forster, Mr. his account of the Vineyards at the Ma- deiras	- - - - -	95, 96. n.

	Page
Frost, its surprising effects on Vines propagated in Pine-stoves, when their roots and stems are exposed	91
Fruits as well as animals are always found somewhere in a natural state - - - - -	53. n.
Fumigating hot-houses, &c. an account of -	- 173.

G

Genuine Tokay Grape, description of - - -	21
Germany, one half of it abounds with fertile Vineyards	210
Gibbon, Edward, Esq.; his account of the first introduction of fruits, herbs, and flowers into our European gardens, from Asia and Egypt -	183. n.
————— his observations on the comparative difference of the seasons in Europe in the present and former ages - - -	191. n.
Golden Galician Grape, description of - - -	17
Good-bodied or generous wine can be made from grapes of an austere taste even before they are quite mature - - -	202
Gooseberries, the varieties of, have of late been greatly improved, and why - - -	56. n.
Grafting of Vines, a practice little known in this country	162
————— the advantage of - - -	ib.
————— how performed - - -	166
————— upon the cherry and fig stocks, the idea chimerical - - -	164, 165
Grapes, the great variety of, growing at Welbeck -	14
————— method of preserving them, an account of -	27. n.
————— the proper sorts to be coupled together, in order to get good seed by their impregnation -	52
————— how to pack when they require to be conveyed to a remote distance - - -	98, 99. n.
————— ripe in Holland in the beginning of March -	136
————— sometimes grow as large as pigeon's eggs	157. n.
————— grow spontaneous in all the Northern parts of America from the latitude of 25° to 45° -	177. n.

	Page
Grapes, peculiar sorts of, which are by nature singularly adapted to make wines in different climates -	201
Grass seeds and spring corn, remarks on the proper season for sowing them - - - -	58. n.
Greek Grape, description of - - - -	29
Grinding of earth, a dissertation on - - - -	45. n.
Grizzly Frontinac Grape, description of - - - -	18
Ground, its necessary preparation for Vines - - -	33

H

Hamilton, Sir William, his account of the beautiful orange-groves, &c. in that part of Italy called <i>Magna Grecia</i> - - - -	96, 97. n.
Hamilton, the Hon. Charles, account of his judicious method of making wine from his Vineyard at Pain's-Hill - - - -	212
----- sold five hundred pounds' worth of wine at one time to a wine-merchant in London, at fifty guineas a hogshead -	213
Hampton Court, account of a magnificent Vine growing there - - - -	186
Hanbury, William, Esq; his account of the surprising progress of some Vines at Kelmarsh in Northamptonshire, 1787 - - - -	86. n.
Health, strength, vigour, and longevity of a plant depends greatly on its good beginning - - - -	58. n.
Hill for the growth of Vines in England, a section of -	204
Holland, an account of the methods of forcing Vines in that country - - - -	110, 136
Honey dews in the summer, are occasioned by a species of insect called Aphis - - - -	172
Hot-house, management of Vines in the - - - -	33
Huetius, his account of the astonishing large bunches of grapes produced in Crete, Chios, and other Islands in the Archipelago - - - -	54
<i>Hungarian</i> wine, the best and most excellent is made only in a very small district near Tokay -	200. n.

I

Page

Impregnation of Grapes, a dissertation on	- -	93
Insects that infest the Vine, the different species enumerated	- - - - -	169
how to destroy	- -	173
Inverted state, Vines and many other plants will grow when so planted	- - - - -	149
Indians, their method of obtaining an agreeable cooling liquor from the palm-tree	- -	194. n.
Introduction, progress, state, and condition of the Vine in Britain — Rev. Mr. Pegge's debate of, with the Hon. Daines Barrington	- - -	ib.
Iron-looking mountains near Malaga, their astonishing annual produce	- - - - -	200. n.
Iron pipes are sometimes successfully used in forcing-houses	- - - - -	136
Iron rods sometimes necessary in a hot-house for the purpose of training Vines to	- - -	85
Isle of Ely, observations on the low and moist lands there	- - - - -	46. n.

J

James the First, Mulberry-trees planted in that Monarch's reign are said to be still living	- - -	180
Janus of the Latins, derived from an oriental word signifying wine	- - - - -	53. n.
Jasmine, may be propagated (on the authority of a monk) by engrafting upon an orange stock	- -	165. n.
Juice of several early grapes is not calculated to undergo fermentation	- - - - -	202
Juno's Temple at <i>Metapontum</i> , supported by vineal columns	- - - - -	182.
Jupiter, an image of, at <i>Populonium</i> , made out of a single Vine-stock	- - - - -	ib.

K

Kensington, wine made from a little Vineyard there,

	which equalled many of the lighter wines of France - - - - -	Page 208
King's Vine-dresser at Rockingham formerly had a livery allowed - - - - -		195. <i>n.</i>
Knife, in summer pruning of Vines, often proves extremely injurious to them - - - - -		148
Knots in timber, how they are sometimes produced - - - - -		70. <i>n.</i>
— in deal timber are preserved by a turpentine matter quite entire, and in their original magnitude - - - - -		<i>ib.</i>

L

Large Black Cluster Grape, description of - - - - -	25
Last swelling of Grapes, an explanation of - - - - -	95
Layers of plants, how the operation is performed - - - - -	60
— of Vines in pots, how performed - - - - -	62
Leaves of Grapes, their diversity of colours, observations on - - - - -	31
Leaves of Corn frequently change to a yellow colour in the spring, and why - - - - -	152. <i>n.</i>
Le Brocq, the Rev. Mr. obtained his Majesty's Letters Patent, for a description of the methods of planting and training fruit-trees - - - - -	206
— his methods, <i>not new</i> , having long been practised in Holland and in this country - - - - -	<i>ib.</i>
Le Cœur Grape, or Morocco Grape, description of - - - - -	16, 17
Lime, observations on - - - - -	48
— made of <i>peak</i> stone, of a rich and mild quality - - - - -	<i>ib.</i>
— rubbish of, often proves injurious to Vine roots - - - - -	49
List of Vines, showing the dimensions of the leaves of each species - - - - -	142
Lombardy Grape, description of - - - - -	21
Lucerne, derived its name and origin from Media - - - - -	185. <i>n.</i>

M

Madeiras, account of the Vineyards there - - - - -	95, 96
Malaga, the great mart of wine and fruit - - - - -	200

	Page
Malmsey Muscadine Grape, description of - - -	23
Malvoise Grape, description of - - - -	21
Manures proper for the Vine - - - -	43
Marks, showing the proper situation for the various sorts of grapes, explained - - - -	15. n.
March, a proper season for sowing the seeds of plants in a hot-house - - - - -	57. n.
Marshall, Mr., his account of dunging Vineyards in France - - - - -	120, 121. n.
Manure, its vast importance in husbandry - - -	160. n.
——— how many farmers may increase their stock of, to more than twice its usual quantity - - -	<i>ib.</i>
Meetings, annual public ones held in Lancashire for the encouragement of increasing the varieties of Gooseberries - - - - -	56. n.
——— similar ones proposed for increasing the varieties of Grapes - - - - -	<i>ib.</i>
Melon-frames may be made to serve for Vines -	138
Miller's Burgundy Grape, description of - - -	25
Mitchell, the Rev. Mr., his curious and important note on the method of raising Vine-plants by a single eye - - - - -	64. n.
Mohammedans of Syria, neither propagated the Vine, nor drank wine but by stealth and trespass -	54. n.
Morocco Grape, description of - - - - -	16
Motion of the sap, a curious dissertation on - -	149. n.

N

Nature of soil cannot be known by its external appear- ance - - - - -	200. n.
New method of propagating the Vine by a single joint of a Vine shoot - - - - -	64. n.
Noah, after the Flood, planted a Vineyard - - -	52. n.
Northallerton, in Yorkshire, an account of a surprising Vine growing there - - - - -	186

Q

O

Oat chaff recommended as being exceedingly proper for packing grapes	- - - - -	99. n.
Observations on the diversity of colours of Vine leaves		31
———— on lime	- - - - -	48
———— on the proper season for sowing spring corn and grass seeds	- - - - -	58. n.
———— on moory or fenny soils	- - - - -	46. n.
———— on forest-trees	- - - - -	69. n.
Oiled paper is sometimes used instead of glass for forcing		139
———— covers, how to be made useful in forcing Vines	- - - - -	ib.
<i>Olearius's</i> account of large Vines near the <i>Caspian</i> sea		182
Old Hock, a Rhenish wine that is sour when newly made, but becomes exquisite by being kept to a good age	- - - - -	202. n.
Olive, a native of Asia, was not introduced into Europe and Africa till two centuries after the foundation of Rome	- - - - -	185. n.
———— timid errors of the ancients respecting its culture were insensibly exploded	- - - - -	ib.
Osiris, Saturn, and Bacchus, were the gods to whom the poets ascribed the invention of wine	- - - - -	194. n.
Ox's bladder, how used to prevent the bleeding of Vines		154

P

Packing grapes, the method of, described	- - - - -	98, 99. n.
Pain's-Hill, account of a flourishing Vineyard there, from which great quantities of wine have been made, that sold in London at the high price of 10s. 6d. per bottle	- - - - -	213
Palm-trees, from which the Indians extract a cooling and agreeable liquor	- - - - -	194. n.
Parsley-leaved Grape, or Ciotat, description of	- - - - -	29
Pegge, the Rev. Samuel, his curious and important note on the enormous bunch of grapes produced at Welbeck in 1781	- - - - -	53. n.

	Page
Pegge, the Rev. Samuel, his debate and observations of the antiquity of Vineyards in Britain - - -	195. <i>n.</i>
Peach-house glass frames may also serve for Vines - -	132
Pith of trees decreases as the wood becomes mature	68, 69. <i>n.</i>
——— dissertation on - - - - -	<i>ib.</i>
Pine-stoves are much more liable to be infested with in- sects than either Grape-houses or Vineries, and why - - - - -	174
Plants, dissertation on the method of raising them, and the various ways, whether by seed, by cutting, or layers, compared - - - - -	63
Plants in a hot-house have a great propensity to incline to the south, and why - - - - -	75
Plan of a Pine and Grape stove - - - - -	103
Plan of a Vinery - - - - -	108
Plan exhibiting a new mode of training Vines in a Vinery	116
Plants, many kinds of, will grow in an inverted state -	149. <i>n.</i>
——— have a natural tendency to turn towards the sun	75
Plan of a section of a hill for the growth of Vines in England - - - - -	204
Position in transplanting trees ought to be strictly ob- served - - - - -	74
——— dissertation on - - - - -	74, 75
Primogenial soil, its supposed spontaneous fruitfulness	42
Pruning Vines, particular direction for - - - -	141
Puddling of soil, its use described - - - -	34. <i>n.</i>
Pulverizing the earth, a dissertation on - - -	45. <i>n.</i>

Q

Quality of the wine is the best criterion to know what soil is the most proper for Vineyards -	200. <i>n.</i>
---	----------------

R

Raisins, the methods of curing them - - -	27. <i>n.</i>
Red Grape from Syracuse, description of - -	16
Red Muscadel Grape, description of - - -	17
Red Frontinac Grape, description of - - -	19

	Page
Red Hamburgh Grape, description of - - -	20
Red Spider much infest and greatly injure Vines -	170
— frequently attacks Vines early in summer -	171
— do not infest the leaves of Vines only, but at- tack the bunches of Grapes also, and greatly in- jure them - - - - -	<i>ib.</i>
— how to destroy - - - - -	175
Rhenish wines when newly made are so sour that they are not fit to drink - - - - -	202. <i>n.</i>
— become exquisite by being kept to a good age - - - - -	<i>ib.</i>
Ripe Grapes, different methods of packing them, when they require to be sent to a remote distance 98, 99. <i>n.</i>	
— in Holland, in the beginning of March -	136
Royal Muscadine Grape, description of - - -	23

S

Scrapings of roads, and the dirt of streets, their great use in promoting vegetation - - -	46
— their great use in correcting moory or fenny soils - - - - -	46, 47. <i>n.</i>
Scissars, the proper sort for thinning grapes described	101. <i>n.</i>
Seedling Vine-plants, how to raise - - -	57
— their future management -	59
Seeds of plants, the proper season for sowing them in a hot-house - - - - -	57. <i>n.</i>
Season, the proper one for sowing spring corn and grass seeds - - - - -	58. <i>n.</i>
Smyrna Grape, description of - - -	22
Small Black Cluster Grape, description of - -	25
Somersetshire, flourishing Vineyards in many parts of, which annually produced some hogsheads of good-bodied and palatable wine - - -	207
Soap-suds, their great use in promoting the growth of the Vine - - - - -	87. <i>n.</i>
Strabo, his account of the enormous Vines in Margiana and other places - - -	53. <i>n.</i> 182.

	Page
Styre Cyder, made of a kind of wilding apple - -	203
St. Peter's Grape, description of - - - -	28
Sun, the primary cause, the very life and soul of vegetation - - - - -	75
Sun-flower, considered bulk for bulk, takes in seventeen times more nourishment than a man - -	152. n.
Syrian Grape, description of - - - - -	24
———— produces enormous large bunches -	52
———— account of a surprising bunch produced at Welbeck in 1781 - - - - -	ib. n.
Syrian Vine, the most proper to be used for stocks to graft upon - - - - -	163

T

Temple of <i>Diana</i> at <i>Ephesus</i> is ascended by ladders made of one <i>Cyprian</i> Vine - - -	182
———— of <i>Juno</i> at <i>Metapontum</i> , was supported by vineal columns - - - - -	ib.
Thrips, a species of insect that abounds in most hot-houses - - - - -	171
———— are injurious to many kinds of plants, and particularly to Vines - - - - -	172
———— attack the grapes as well as the Vine leaves -	ib.
———— how to destroy - - - - -	173
Thinning Grapes upon the bunches, how to perform -	101
Timber-trees, how to prevent from decay - - -	69. n.
Time of the Vines flowering, a critical period, that ought to be observed with great attention - -	125
———— state of the air in a Vinery at that critical season - - - - -	126
Trees, some kinds, in the bleeding season, in a few hours, weep more than they will weigh -	149
Twiss, Richard, Esq., his account of the method of curing raisins in Spain - - - - -	27. n.

U

Unctuous and sulphurous quality of fenny soil often proves pernicious to newly-planted trees	- 46. n.
---	----------

V

Valencians, their methods of curing raisins described	- 27. n.
Varieties of Grapes growing at Welbeck	- 15
———— the great probability of their im- provement	- 56. n.
Vegetables do not grow in vacuo	- 152. n.
Vine, the various ways it admits of being propagated	- 49
—— when raised from seed requires various previous precautions	- 50
—— how to raise by layers	- 60
—— how to raise by cuttings	- 62
—— how to plant out for the hot-house	- 82
—— its surprising annual progress	- 86
—— one six hundred years old, and another twelve feet in circumference	- 182
—— grew wild in the island of Sicily, in the time of Homer	- 184. n.
—— an extensive one growing at Northallerton, in York- shire	- 186
———— at Hampton-Court	- <i>ib.</i>
———— near Ilford in Essex	- 187
———— at Bury in Suffolk	- 188
Vinery, or proper receptacle for forcing Grapes, a de- scription of	- 108
—— pitch of the roof ought to vary according to the time or season in which the Vines are intended to be forced, and why	- 109
Vines planted in the open ground, method of forcing them recommended	- 138
—— bleeding of, often proves extremely injurious	- 149
———— proper methods of prevention	- 150
Vineyards at the Madeiras, a description of	- 95, 96. n.
—— in France, the method of dunging them, a de- scription of	- 120. n.

Page

Vineyards, in Germany, situate within the 51st degree,	
are cultivated with great advantage - -	191. <i>n.</i>
----- account of a singular one in Catalonia -	198. <i>n.</i>
----- in various parts of England, from whence	
good wines have been made - - -	207
Virgil's description of a soil proper for Vines - -	39. <i>n.</i>
Vispré, Mr. F. X., short account of his dissertation on	
the growth of wine in England - -	205
----- of his Vineyards at	
Wimbledon - - - - -	<i>ib.</i>
----- and at Chelsea -	<i>ib.</i>
----- his method of training Vines upon the	
ground, like the Vines of melons and cucum-	
bers, taken from an hint given by the great	
Lord Chancellor Bacon - - - -	<i>ib.</i>
----- in May, 1784, presented to the So-	
ciety for the Encouragement of Arts, &c. a	
plan adapted to this climate, for cultivating	
Vineyards - - - - -	206
Vitis, Vine - - - - -	13
----- generic character - - - - -	<i>ib. n.</i>
----- essential character - - - - -	14. <i>n.</i>
----- specific character - - - - -	<i>ib.</i>

W

Water, its vast importance in Vineyards, &c. in very	
hot climates - - - - -	96. <i>n.</i>
Wedgwood, Mr., his account of the surprising growth	
of Vines - - - - -	43. <i>n.</i>
Welbeck, the great variety of Grapes growing there -	14, 15.
White Corinth Grape, description of - - -	30
White Frontinac Grape, description of - - -	18
White Grape from Alcobaca, description of - - -	<i>ib.</i>
White Hamburgh Grape, description of - - -	20
White Muscat of Alexandria Grape, description of -	15
White Muscadine, or Chasselas Grape, description of -	22

232 INDEX TO THE TREATISE ON THE VINE.

	Page
White Morillon Grape, description of - - -	25
White Muscat Grape from Lùnel, description of -	30
White Raisin Grape, description of - - -	27
White Sweetwater Grape, description of - - -	19
Willows, &c. will grow in an inverted state - -	149
Wine, coeval with the first vegetable productions -	193. <i>n.</i>
— Plato's most exalted praise of - - -	194. <i>n.</i>
— the invention of, ascribed to the gods, and called their ambrosial nectar - - -	<i>ib.</i>
— of a good body can be made from Grapes of an au- stere taste, even before they are quite mature -	202
— made from a little Vineyard at Kensington, which equalled many of the lighter wines of France -	208
— excellent, made from the Bath Vineyards -	<i>ib.</i>
— white, like Champaign, made at the Vineyard at Pain's-Hill, sold for 50 guineas a hogshead -	213
— retailed at from 7s. to 10s. per bottle - -	<i>ib.</i>
Wright, Edward, Esq., his elegant account of the festoon Vineyards in Lombardy - - -	180. <i>n.</i>

Y

Young Vine-plants, when raised from seed, require par- ticular attention during their infant state -	58
---	----

10

by Longman

W^m. Speech

A PLAN of an approved PINE and GRAPE STOVE.

Ground Plan

Elevation of the Front Wall

Published Sept. 25. 1863. by Longman & Co. as the Act directs.

Section.

40

ngman & C^e as the Act

Section of a Fluid Wall.

Plate II page 108

Elevation.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 1.

Fig. 5.

Fig. 6.

The Different Modes of Lines trained against a Wall.
by LEITCHMAN & CO.

by Longman & Co. the London

J. H. Green

R. Smith sc.

Callerton.

W. H. H.

by Longman & Co. as the Act directs.

A remarkable vine growing at Northallerton.

South of village 171823

See Longman & Co. on the Art. above

a to b eight feet. Breadth from b. to a. six feet.

Bayire, Sc.

in England?

by Longman & Co. as the Act directs.

Height from a to b eight feet Breadth from b to c six feet

Engraved

The Section of a Hill for the Growth of Pines in England.

Published by Longman & Co.

by Longman & Co. as the Act direct.

A

TREATISE

ON THE

CULTURE OF THE PINE APPLE,

AND THE

MANAGEMENT

OF

THE HOT-HOUSE.

TOGETHER WITH A DESCRIPTION OF EVERY SPECIES OF

INSECT

THAT INFEST HOT-HOUSES,

WITH

EFFECTUAL METHODS OF DESTROYING THEM.

TO
HIS GRACE
THE
DUKE OF PORTLAND,

&c. &c. &c.

MY LORD,

THE motives which induced me to request your Grace to take the first Edition of this Work under your protection, have been so fully justified by the event, that I trust your Grace will not refuse the continuance of that Patronage, the advantage and honour of which my gratitude is unequal to express.

I have the honour to be,

My Lord,

Your Grace's

Most dutiful servant,

W^M. SPEECHLY.

PREFACE.

GARDENING, as well as Agriculture, has received great improvement from the industry of the present age ; nor indeed is this to be wondered at, when we see so many of the first characters in this country daily exerting themselves in support of this elegant and useful art, no branch of which has been deemed more important than that which comprehends the management and construction of stoves, for the purpose of producing fruits and flowers. I therefore presume that a Treatise, which has for its chief object the culture of the Pine-apple, and the preservation of that plant from the various attacks to which it has been hitherto exposed, will not be unacceptable to the admirers and encouragers of Gardening : more particularly when they are informed that the following sheets contain the result of many years' attention and experience.

A good stove, well managed, affords an agreeable mixture of *profit* and *pleasure*, as well by accelerating the growth of many excellent kinds

of indigenous vegetables, as by furnishing us with a variety of fruits and flowers, the natives of a warmer climate : and all these too in such perfection, and at such various seasons, as must ever be productive of amusement and advantage.

It also affords a source of pleasure of a still different nature, especially to those who reside much in the country : for as many months intervene between the first formation of fruits, and the time of their perfection, there is an almost daily variety, which occupies, and at the same time relieves, the speculative mind when oppressed by long attention to objects of business or study.

The culture of the Pine has already been treated of by many persons, who have varied much in the methods they have recommended. Far from meaning to depreciate their labours, I shall only observe, that my advice and pretensions rest solely upon the success which I have met with in my experiments.

As the vegetable mould, from decayed leaves, is used in the compost for the Pine-apple plant ; and as the use of oak-leaves in hot-houses is a very important article of information, I have given the process of that method at the end of the first book.

It being a practice with some to fruit the Pine by setting the *pot* in water ; while others produce the fruit by setting the *plant* only in water, (in a similar manner to what is often practised with Hya-

cinths and other bulbous roots,) the passing over these methods in silence may, by some, be deemed an omission : but as neither of these methods can be reduced to practice with any kind of success, except on fruiting plants, and just in the hot summer months, when the situation of the plant ought to be very near to the glass, they do not seem calculated for general practice.

However, as some persons are inclined to suppose that Pines raised by these methods are generally of superior quality, I shall just beg to say, that the first method, of setting the *pot* in water, is greatly to be preferred, and that the best time for adopting it is immediately after the plants have shown fruit in the spring.

Hot-houses are now in general use, and the culture of the Pine-apple is, in some sort, understood by almost every gardener, not one of whom but concurs in lamenting the injury to which this plant is liable from two species of insects, which are generally imported along with it. These are now become too common in most stoves. And as the nature of these insects is not clearly understood, and as some have been of opinion that there is no difference of species between them, I have given figures of each : to these I have added the *Coccus Hesperidum*, it being also generally found upon the Pine-apple plant.

I esteem myself greatly indebted to my late very

ingenious and learned friend, the Rev. Mr. Michell, who enabled me to give a better descriptive and historical account of these insects, than I otherwise could have done without his kind and friendly assistance.

Very many methods have been taken to extirpate these insects, most of which, on trial, have been found ineffectual ; or, what is more unfortunate, have in a manner destroyed the plant itself.

It is no uncommon idea that there are methods of keeping the insects down, so as to prevent their doing any material injury : but it is well known to every one conversant with their manner of breeding, that their increase in the summer months is exceedingly rapid, and that there are few methods used to expel them that do not injure the plants in a greater or lesser degree : therefore constant and repeated applications, for the purpose of destroying the insects, must necessarily be a continual check to the growth of the plants. These circumstances point out the necessity of a never-failing remedy ; and such I am warranted, by experience, to offer to the public.

It became my indispensable duty to lay down, with the most exact precision, the method I practised in destroying these insects : and that I have done with truth and sincerity. The few cautionary remarks, that are enclosed between [crotchets] may be used or omitted at the option of the person who

puts the method in practice. However, I could wish to recommend that the principal part of the directions, so marked, should be adopted; especially as they are not attended with much additional expense.

There is the greatest probability that a much easier method may yet be practised, than that which I have hitherto pursued, and that the insects on Pines may be destroyed by infusing quicksilver in the water kept for the use of the hot-house. This, however, I only give as a probable speculation, because after I had destroyed all the insects on the Pines in the stoves of which I had the care, I was deprived of the means of making any farther experiments.

It may be objected by some, that simple water is not capable of taking any thing from the quicksilver, and that I should have proposed other methods to keep that metal in a state of suspension. In answer to this I shall only observe, that as the composition I have recommended for the destruction of insects had never failed me, I judged it unnecessary to make any alteration in it. Such persons as choose to enter upon a course of experiments, in which the suspension of quicksilver in water becomes necessary, will be able to produce that effect, by means of a strong mucilage of gum arabic; and indeed many other substances are capable of performing that office.

Besides the insects which infest the Pine-apple plant, there are other kinds that infest hot-houses, and which are very prejudicial to most kinds of plants, viz. The *Aphis*, the *Acarus* or *Red Spider*, the *Thrips*, the *Oniscus* or *Woodlouse*, the *Formica* or *Ant*, and the *Grillus* or *Cricket*. A description of these insects, and the different methods of destroying them, compose the third book.

I was induced to make this addition to the work, from the satisfactory result of some experiments I made on the destruction of the *Acarus* or *Red Spider*, which is well known to be very destructive to many plants when kept under glass, particularly to the Vine.

Although some of these last-mentioned insects are very common with us, yet as others of them are not generally understood, I have given the classes, and a description of each species (taken with little deviation) from “*Institutes of Entomology*”^a published by Mr. Yeats.

Since the first edition of this work was published (1779) there have been many improvements made in the branch of gardening herein treated of, and particularly in the use of steam in the Pine-stove and in Forcing-houses.

^a This judicious introduction to entomology is selected from the following celebrated authors, viz. Linnæus, Geoffroy, Scopoli, and Schæffer, to which the author has added many ingenious remarks.

The new method of burning lime in stove fire-places may also be considered as an acquisition on the score of improvement. These practices I have endeavoured fully to elucidate and further to explain by plates.

There have also been many new and valuable kinds of the Pine-apple plant introduced into the Pine-stoves in this country from various parts of the globe. In this work a description of these may be considered as a necessary piece of information: but I have deemed it proper only to describe such kinds as have come within my own immediate knowledge, and that are actually cultivated in the Pine-stoves in Welbeck garden.

I must beg leave to present my most grateful acknowledgments to my very excellent, worthy, and learned friend Dr. A. Hunter: his kind assistance and friendly attention to this work during the time it was in the press, has greatly contributed towards rendering it more worthy of the public approbation.

W. SPEECHLY.

Welbeck, January 1. 1796.

[The text on this page is extremely faint and illegible. It appears to be a handwritten document, possibly a letter or a journal entry, with several paragraphs of text. The ink is very light, and the handwriting is cursive. The page is numbered 15 in the bottom right corner.]

15

ON THE
CULTURE
OF THE
PINE-APPLE, &c.

BOOK I.

HOT-HOUSES are found by experience to be of so much importance, that no garden is esteemed complete without one. A good hot-house, indeed, may be considered as a kind of garden itself, as it furnishes both fruit and vegetables much earlier in the spring than they could be obtained by any other means : it also affords an opportunity of raising, with great ease, many exotic plants, as well for the use of the table as the ornament of the flower-garden.

But though the original and principal object of an hot-house consists in bringing the tropical fruit, called the *Ananas*, or Pine-apple, to a considerable degree of perfection, yet, if properly constructed, it may, at the same time, be equally well adapted to the culture of the Vine.

Of late years great improvements have been made in respect to the construction, as well as the situation of hot-houses; and on both of these articles their success very essentially depends.

Various are the opinions of the persons who have written on the cultivation of the Pine-apple. In this attempt of mine, I am far from meaning to depreciate the labours of those who have gone before me, the only purpose of this tract being to communicate such observations as have suggested themselves to me, during an experience of between thirty and forty years in Pine-stoves.

On the Varieties of the Pine-apple Plant.

It would be an endless, as well as unnecessary trouble, to enumerate all the varieties of the Pine-apple plant, many of which are of no other value than to be kept in botanic gardens for their various distinctions.

In the year 1768 I raised above seventy Pine-apple plants from some seeds that were sent to the Duke of Portland, from the West Indies, most of which varied in some distinctive circumstance, either in their leaves or fruit.

The result of this experiment did not, however, terminate equal to my wishes; for although the new varieties thus obtained were, in general, fruit of great elegance and beauty, yet many of them turned out of inferior quality. Probably the seed might have been saved from Pines indiscrimi-

nately; and I have been informed that, for want of attention, many inferior kinds of Pines are cultivated in some of the West India islands. In general, inferior kinds of fruit are commonly the most prolific.

As new kinds of the Pine-apple plant may constantly be raised from seed, I shall not dwell on the subject of its varieties, but shall only mention such as are in most general cultivation, or as appear to me to deserve a place in modern stoves.

1. The QUEEN PINE. This is the most common of all the kinds in this country. The fruit is large and well formed: its flesh is of a fine yellow colour; but in the hot summer months it is very apt not to cut firm, is liable to crack in the middle, and often contains a very insipid watery juice: but when it ripens late in the year it is not subject to any of these defects.

Although the *Queen Pine* is of inferior quality to some of the new-acquired kinds, still, as it is much more certain of showing fruit at a proper age and season than most of the other sorts, it continues to be cultivated on that account, in many hot-houses, in preference to the rest.

2. BROWN ANTIGUA PINE, commonly called the *Black Antigua*. This is a very large fruit, at first of a greyish black colour, but becomes yellow as it approaches maturity. The flesh a pale yellow, and more melting than any other sort, abounding with a quick lively juice, of an exquisite flavour,

especially when cut just on the point of changing from green to yellow. In the hot months this Pine should be cut on the first appearance of such a change : but late in the autumn it should be permitted to attain a yellow colour ; and even then it is sometimes too tart to be reckoned agreeable.

This kind is very distinguishable by its leaves, which grow very long, narrow, and are of a dark green, tinged with a pale purple, or brownish colour.

3. ANTIGUA QUEEN PINE. This is a large fruit, and, when well formed, is a most handsome Pine : but early in the season, if the plants receive a check at the time of showing, it generally produces imperfect, crooked, and mis-shapen fruit. The flesh is of a pale yellow colour, but less delicate and less excellent than that of the former. The leaves are very coarsely indented at the edges, grow much broader, but not near so long as those of the former. Both the Antigua Pines are remarkable for having large swelled protuberances, as well as for producing secondary suckers under the fruit much more numerous than those of other sorts.

4. PROVIDENCE PINE. This produces a larger sized fruit than any of the kinds cultivated in this country. Inclining to a pyramidical form, at first it is of a brownish grey colour ; but, on the approach of maturity, it changes to a pale yellow. The flesh inclines to yellow, and is more melting than most other sorts. It abounds with a very

quick lively juice, nearly similar to the *Brown Antigua*, to which it seems somewhat allied.

The leaves are long, a little like those of the *Brown Antigua*, but less keel-shaped, and grow more broad than the other sorts. They are of a greyish green, tinged with a lively pink or purple colour.

A fruit of this most excellent Pine was produced in the gardens at Welbeck, in 1794, that weighed $5\frac{1}{4}$ lb. or 84 oz., and from a plant that was not a large one.

This valuable fruit may be considered as a great acquisition to the Pine-stove ; but it is much to be regretted that it should require so long a period in bringing the plants to a fruiting state. I have been informed they sometimes do not come into fruit before the fifth or sixth year.

There seems to be a variety of the Providence Pine, with a fruit more pyramidically formed, and having narrower leaves, of a deeper green colour.

5. ST. VINCENT'S PINE. This is a middling sized Pine, of a pyramidical form, at first of a black green, but, when ripe, changes to a yellowish olive colour. The flesh, which is yellow, is compact, melting, and abounding with a very rich and high-flavoured juice. — But when this fruit comes late in the season, it is very subject to decay before it arrives at a mature state. — The leaves of this most excellent Pine are distinguishable from those of the other sorts. They are in length similar to those of the *Queen Pine*, but are not of so dark a

green colour; are finely indented at the edges, and very narrow. — This is by some called the *Green Olive Pine*.

6. SUGAR-LOAF PINE. This is a large, elegant, tall fruit, of a pyramidical form; at first of a pale green, but when near ripe changing to a fine yellow colour. The flesh is firm, of a deep yellow, and abounding with a quick lively juice of exquisite flavour. But the flesh of this Pine is more hard (sometimes inclinable to be stringy) and less delicate than some of the other sorts.

I have been informed that the Sugar-loaf Pine is in the first estimation, and almost generally cultivated, at Barbadoes.

There are three varieties of the Sugar-loaf Pine: 1. The brown-leaved. 2. The green-leaved, with purple stripes and spines on the edges. 3. The green-leaved, with purple stripes and smooth edges. This last sort is at present the most rare; the leaves are of a deeper green than the former, and have a glossy, shining appearance.

The leaves of all the three varieties are long, deeply keel-shaped, and those of the 1st and 2d are finely indented at the edges.

7. MONTSERRAT PINE. This is a pretty good sized Pine, truly tun-shaped, and of a bright copper colour. The flesh a deep yellow, somewhat melting, and abounding with a rich and well-flavoured juice.

The protuberances of this Pine, by growing nearly flat, render the fruit, when well swelled,

almost smooth, and forming thereby an elegant appearance. The leaves grow nearly similar to those of the *Sugar-loaf Pine*, are keel-shaped, of a glossy dark green, tinged with a deep purple or brownish colour, and very finely indented at the edges. — There is a singularity in this Pine which enhances its value, viz. in the autumnal months, and even during winter, it produces a fruit much more swelled, and more perfect, than that of the other sorts, and is not liable to suffer by decay or imperfection, either in the fruit or the stalk, as is usual with those of the other sorts, in a season when the sun's power is not great.

8. BLACK JAMAICA PINE. This is a large pyramidal fruit; it is at first black, but, as it approaches maturity, becomes of a brownish yellow colour. The flesh is a pale yellow, compact and somewhat hard, but is less succulent and less excellent than some of the former. The leaves are long, like those of the *Black Antigua*, are of a dark green, tinged with purple, and are less keel-shaped than those of most other sorts. — This Pine has been much sought after, and is still held in great estimation by many.

9. HAVANNAH PINE. This forms a low, short fruit, somewhat tun-shaped; at first it is of a dark green, but, when ripe, becomes of a pale lemon-colour. The protuberances of this Pine generally swell very large. The flesh, which is nearly white, is soft, melting, and abounding with a very tart or acid juice, for which it is by some greatly admired;

although by many it is considered as too tart. — Sugar is constantly used with this fruit.

10. RIPLEY PINE. This is a very large fruit, and elegantly formed. At first it is of a dark purple or blackish colour, but as it becomes ripe changes to yellow. The flesh is of a pale yellow, is somewhat hard, and less succulent than some of the others. It has long leaves, which are of a dark green, tinged with a deep chocolate colour. The edges of the leaves are very closely and deeply indented. — Some years ago I received a Pine-plant, by the name of the *Mocho Pine*, which having fruited here, and appearing similar to the foregoing both in the plant and the fruit, I cannot take upon me to affirm that it is a distinct species.

And here I must beg leave to remark, that although some of the foregoing Pines are so nearly similar as hardly to admit of a descriptive difference, still, to a person well versed in Pines, there are indescribable appearances in the face of the fruit or its quality, the leaves, the form of the plant, or manner of its growing, that stamp a real and visible difference in the various species.

11. The KING PINE. This has grass-green, smooth leaves, and produces a pretty large fruit ; but as its flesh is hard, stringy, and sometimes not well flavoured, it is so little esteemed, that few hot-houses admit more than two or three plants of this kind.

12. The SILVER-STRIPED PINE, from Surinam. This exceeds, in beauty, the whole tribe of varie-

gated plants. Its leaves are variously striped with a dark green, and delicate white ; and the whole is tinged with a lively red, which produces a contrast, that gives the plant a gay and most beautiful appearance. Nor is there less beauty in its fruit, the protuberances of which swell large, and, when near ripe, are variously marbled with red, green, yellow, and white ; which, together with the variegated crown on the top of the fruit, add a singularity and elegance to the whole beyond the power of description.

13. The GOLD-STRIPED PINE. This produces a large and elegantly formed fruit, and is at the first beautifully marbled with red, green, and white, which gives it a gay and lively appearance even in its infant state. On the approach of maturity it becomes of a deep yellow.

The flesh is compact, of a gold colour, abounding with a rich and well-flavoured juice.

The leaves are edged with broad stripes of a greenish yellow colour ; are less diversified and less beautiful than the *Silver-striped Pine* : but on account of its producing a large and excellent fruit, it has been much sought after by the curious.

14. STRIPED QUEEN PINE. This is an accidental variety obtained from the *Queen Pine* at Welbeck about twenty years ago. It is nothing different from the common *Queen Pine*, excepting in the singularity of its leaves, which are beautifully variegated with green, purple, and white. In summer

the whole plant is strongly tinged with a fiery red, which gives it a gay and most beautiful appearance.

There are two or three other varieties of variegated Pines, but less deserving of notice than the former. Likewise a more extensive variety in common cultivation ; but I judged it expedient to describe no other than the sorts now growing in Welbeck garden, and of which I had tasted the fruit myself.

There are Pines which go by the names of the *Barbadoes*, *Tobago*, *Dominica*, and all the rest of the West India islands. These are frequently one and the same kind ; and so long as we call them by the names of the places from whence they come, we shall ever be liable to confusion.—The Duke of Portland has frequently received Pine-plants from different and remote parts of the West Indies, in no one characteristic of which I could perceive the least distinction.

I have heard it asserted that there are Pines with *green*, and have been assured that there are others with *red* flesh ; but I must confess that I have never seen one of either, that, to my apprehension, could properly be so distinguished. The fruit of the Queen Pine is often cut when green, (just on the point of changing yellow,) and in the hot months this method is judicious ; but I cannot think that this entitles the kind to be called the *Green Pine*.

In the year 1771, I brought a Pine-plant from Holland, by the name of the *Red-fleshed Pine*. The gentleman in whose possession it was, assured

me that its fruit cut as red as any kind of peach at the stone, or as the root of red beet. It fruited in the garden at Welbeck in 1774, but the fruit was very small, cut hard and stringy, and was not in the least red. I therefore suppose that the gentleman who gave it me had never seen the fruit himself.

After all, however, I by no means take upon me to deny the above assertions ; for though I have never seen any proof of them myself, considering the similar instances of both in other kinds of fruit, viz. the former in the melon, and the latter in the peach, apple, and pear, it would ill become me absolutely to refuse to give them credit.

On the different Ways of propagating the Pine-apple.

THE Pine is propagated sometimes by seed,¹ but generally by crowns and suckers. The seeds are produced in the inside of the protuberances of the fruit, are small, of a dark colour, and in shape not unlike the seed or kernels of the apple or pear.

The crowns are produced on the top of the fruit, of which there is seldom more than one ; but there are instances of two or more being joined together.

The suckers are produced in various parts of the plant, but most generally from between the leaves, near the middle of its stem ; and the suckers produced in that part are esteemed the best. The Brown Antigua, the King, and the Sugar-loaf kinds, commonly produce suckers at the top of the stem immediately under the fruit ; but these are gene-

rally small, (by gardeners usually called gills,) and therefore of much less value than the former. Suckers, too, will sometimes arise from the bottom of the stem at the root of the plant ; and in that situation they are generally well rooted when grown to a proper size to be taken off.

Suckers are preferable to crowns, being generally of a much larger size ; the goodness of either does not at all depend on the length of their leaves, but on the substance of their stems at the bottom. I have sometimes had crowns that measured, at their bottoms, more than nine inches in circumference, and in such a case they are equal almost to any suckers.

Crowns which grow upon late autumnal fruit, are commonly larger than those produced earlier in the season.

On raising the Pine from Seed.

I BELIEVE that there have been but few instances of the Pine-apple perfecting its seed in this country. And I have been informed that the seeds are so scarce in the West Indies, that there is seldom more than one found even in thirty or forty fruit.

When the seeds of the Pine are sent into this country, it will be advisable to keep them in a warm room till the latter end of March, or beginning of April. At that season the seed will be more likely to vegetate than if sown earlier in the year.

Pots should be prepared, and filled with very

fine rich mould within one inch of the top, and plunged in a warm part of the tan-bed, a day or two before the seed is sown, that the mould may become warm. The seeds should be sown one inch apart, and covered about a quarter of an inch with the same mould as that in the pots. Then the pots should be immediately covered with a piece of glass, which should fit the tops very close; this, by preventing the mould from drying, and giving an additional heat to it near the surface, will soon cause the seeds to vegetate. Neither air nor water will be required till the plants begin to appear, when a little air should be given in the day-time only; let the plants be sprinkled over with water every four or five days, in case the weather is fine and clear; but should it prove dark and moist, once in ten days will be sufficient. As the plants advance in size, a greater quantity of air should be given them in proportion to their progress, and by the time they have six or eight leaves, they will have strength to withstand the general air of the hot-house; and from that time will require a little water twice a week.

The first leaves of seedling Pines are very small and tender, much resembling the smallest blades of grass; the plants therefore should by no means be left uncovered till they have acquired strength, as the Onisci or Wood-lice (with which most hot-houses abound) would in one night destroy the hopes of the crop. It will also be advisable, when

the glasses are first taken off the pots, to sprinkle the plants with water, and immediately dust them with a little snuff or tobacco-dust, which, being put into a puff, or small piece of gauze, may be thrown upon them with great ease; a very small quantity will prevent those insects from injuring the plants. This method will also secure other young and tender plants, kept in hot-houses, from the like accident.

By the end of August the seedling Pines will be grown to a proper size for transplanting, when they should be put into small pots, filled with the same mould recommended for crowns and suckers; and from that time their treatment requires no difference from that of the others.

On raising the Pine by Crowns.

THE crown is perfected at the time when the Pine-apple becomes quite yellow; therefore the crowns of such fruit may be planted as soon as taken off: but if the fruit be cut green, as is practised by some persons with the Queen Pine, or if only the top of the fruit be green when cut, as is the case frequently with the Sugar-loaf kinds, (even when the principal part of the fruit is thoroughly ripened), then it will be necessary to let the crowns of such fruit lie a few days after they are taken off, in a shady part of the hot-house, in order to give them that degree of maturity to which nature was not allowed to conduct them.

Where there is convenience in the hot-house,

or if a hot-bed be in readiness, the crowns, after having lain a few days on the flues, may be planted in small pots filled with earth, and treated in the same manner as will hereafter be recommended for the suckers.

As the crowns are taken off daily during the Pine season, the quantity of them at one time is never so considerable as to make it worth while to be continually preparing hot-beds for them. But that no time may be lost, the most advisable method is to plant them for some time in the tan-bed, where there are always vacant spaces between the large plants in the fruiting pit, and there the crowns will be preparing their roots against the time of their potting.

But before the crowns are planted, their lower or bottom leaves should be shortened with the knife or scissors, as it will cause them, when planted, to decay much sooner, and make room for the roots to be produced with the greater ease.

I by no means advise that the crowns stand a long time in this situation, for if their roots are permitted to grow to a great length in the tan, (as is practised by some) they will inevitably receive a check at the time they are shifted into the pots, which may be prevented by potting them as soon as they begin to strike, or at least by the time their roots are grown to the length of one or two inches; but this cannot be ascertained so well by time as by observation, much depending

on the temperature of the tan as well as the season. When the weather is warm, and the tan heats kindly, they will make a greater progress in ten or twelve days, than in a month, when the tan is in a declining state, and the season cold and dark.

The crowns will require very little water during the time they remain in the tan ; a gentle sprinkling or two will be quite sufficient.

When the crowns are removed from the tan, they should be taken up with great care, and cleared of all decayed matter at their bottoms, and immediately planted in small pots filled with the compost mould hereafter recommended, and from that time treated as the suckers, in the following manner.

On raising the Pine by Suckers.

As the fruit of the Pine-apple is the principal object, and sole reward of the great expense and trouble attending its management, few persons choose to permit the suckers to remain on the plants till they grow very large, as they would injure the fruit and prevent its swelling ; they are therefore generally taken from the plants as soon as it can be done with safety. But where a stock of plants is the object, the advantage which might be gained in the fruit is given up, in order to promote the growth of the suckers, by permitting them to remain on the old stools some time after

the fruit is cut. In this situation the suckers will grow very large, provided the stools are plentifully supplied with water : and if some of the most forward and strongest suckers are permitted to remain on the old stocks (only one on a stool) they will sometimes produce tolerably good fruit the next season. When this is intended, if the sucker grow near the bottom of the stool, a few of the leaves immediately under it should be cut off, and mould raised to the bottom of the sucker (which may easily be done by the help of a piece of a broken pot) in order for the sucker to strike; after which time it will grow amazingly fast, by receiving nourishment from its own roots, as well as from those of the parent stock; therefore, as it advances in size, the leaves of the old stool should from time to time be taken off, in order to make room for it.

Having thus pointed out the different modes that are practised, I return to the former, as being the most eligible.

Suckers cannot with safety be taken from the plants, till they are grown to the length of twelve or fourteen inches, when their bottoms will be hard, woody, and full of small round knobs, which are the rudiments of the roots. It would endanger their breaking if they were to be taken off sooner.

When the suckers are taken off, the operation should be performed with great care, that neither plant nor sucker may be injured. To prevent

which, one hand should be placed at the bottom of the plant to keep it steady ; the other as near to the bottom of the sucker as conveniently can ; after which, the sucker should be moved two or three times backwards and forwards in a sideway direction, and it will fall off with its bottom entire. Whereas, when a sucker is bent downwards immediately from the plant, it frequently either breaks off in the stem, or splits at the bottom.

Before the suckers are taken off, pots should be provided for them filled with the compost mould, which will be recommended under that article. Where there are succession or breeding stoves, there is generally some part of the tan-bed assigned for their reception, which should be renewed with a little fresh tan on the occasion, and this should lie a few days till the heat begins to arise, before the pots are plunged into it.

Sometimes hot-beds are made for the suckers. When that is the case, they should be prepared at least fourteen days before the suckers are taken off, in order that the violence of the heat may be over : after the bed has been made ten days, it should be levelled, and covered eight or ten inches with tan ; and after this has lain four or five days, in case the heat of the bed should not be violent, the pots may be plunged into it.

Whichever of the above methods is pursued, it will be proper to bestow great attention to the temperature of the bed afterwards ; and in case its heat increases, the pots should be raised.

The size of the pots comes now to be considered. The general method hitherto used to describe the different sizes of the pots for Pines has been by their prices; as penny pots, two-penny pots, &c; but as I have found that pots of the same size differ very considerably in their prices in different parts of the kingdom, it appears to me so indecisive and dissatisfactory, that I shall subjoin a scale containing the dimensions best adapted to the several uses.

		Inches diameter at the top	Inches deep
1.	{ Pots for full-sized crowns and suckers }	6	5½
2.	{ ——— for plants to fruit the following season when shifted in March }	8½	7
3.	{ ——— for fruiting plants }	11½	10

I wish it to be understood that the above dimensions are only used for full-sized plants at their different periods: plants below the standard must have less-sized pots in proportion.

After the suckers are taken off, their bottoms should be cut smooth, as some of them will split a little, and be ragged. Such of them as are hard, woody, and have their nobs (or rudiments of the roots) turgid, may be planted immediately: others that appear soft, and not so mature, should lie a few days in the hot-house to harden, and be better prepared for vegetation. Crowns and suckers do not suffer, like any other plant, by this operation, as some persons imagine. A large sucker will

vegetate after having lain six of the hottest months in the year exposed to the sun in the hot-house. Whereas, almost any other plant of the same size and substance would in that situation lose its vegetative powers in less than a tenth part of that time.

When the suckers are put into the pots, it is not necessary for them to stand deeper in the mould than just to keep them fast ; in this situation they may remain ten or twelve days, by which time, if the bed heats moderately, they will begin to strike, when they should be gently watered over their leaves ; and after the plants are well rooted they may be watered twice a-week from that time to the end of September, provided the weather is fine. But it must always be remembered, that the Pine-plant requires much less water in a moist than in a dry season, as the humidity of the air in a great measure answers the purpose of watering.

When the weather is warm, a great deal of air should be admitted, and care should be taken to keep the pots in a constant and regular heat, by adding a little fresh tan whenever the heat of the bed begins to decline.

In September the plants should be carefully looked over, and all the forward crowns and suckers that are grown large, and with an appearance of being *under-potted*, should be removed into larger-sized pots with their roots and balls entire. From this time (beginning of September) the plants should be watered only once a week till

November, in case the weather proves fine ; but should it be dark and cold, once a fortnight will be quite sufficient, especially towards the latter part of that time. After this the hot-house should be kept in a cold state, ^b and little or no water given the plants till the middle or latter end of January, as the weather may prove more or less favourable ; for as there is always a moisture in the tan, in which the Pine pots are plunged, and, as the pots are porous, the roots of the Pine generally imbibe a sufficient quantity to support the plants during the above season, when they are nearly in a state of inaction : however, in some seasons, a gentle watering or two may be given, especially when there is a *kind* bottom heat, which, during the above time, will be absolutely necessary.

But it sometimes happens in a long-continued frost, that it is found difficult to keep the tan in that desirable state ; for it is rather inconvenient to renew the tan-bed in such a season, when fresh

^b In a morning the spirits of the thermometer should not be higher than one or two degrees below the point marked *temperate*. The author makes thermometers for sale on an elegant construction, graduated to a scale entirely adapted for the culture of the Pine-apple plant. — But, in order to give his readers a just idea of the *measure* of a *degree*, referred to in this work, he thinks it will be proper to inform them, that the space between *temperate* and *freezing point* is divided into ten equal divisions, which serve for a scale of degrees. However, for the further satisfaction of the curious, a second scale of degrees is also given on the plate, corresponding with that of Fahrenheit's, as being more generally known.

cold tan would be liable to starve the house. In such a case, the most advisable method is to plunge the Pine pots so deep in the tan that their rims may be covered two or three inches; the roots of the Pine-plants will thereby receive a greater degree of warmth, and it will also prevent the surface of the mould in the pots from becoming too dry.

There is nothing so prejudicial to the Pine-apple plant, (insects and an over-heat of the tan excepted,) as forcing them to grow by making large fires, and keeping the hot-house warm at an improper season, which is injudiciously done in many hot-houses. It is inconsistent with reason, and against nature, to force a tropical plant in this climate in a cold dark season, such as generally happens here in the months of November and December; and plants so treated will in time show the injury done them; if large plants for fruiting, they generally show very small fruit-buds with weak stems; and, if small plants, they seldom make much progress in the beginning of the next summer.

As the length of the days, and power of the sun increases, the plants will begin to grow, and from that time it will be absolutely necessary to keep them in a regular growing state; for if young plants receive a check afterwards, it generally causes many of them to go into fruit. From the time they begin to grow they will demand a little water: once in a week or ten days,

as the weather may prove more or less favourable, will be sufficient till the middle of March, which is the most eligible season to shift them in their pots. If that work is done sooner, it will prevent the plants from striking freely; and if deferred longer, it will check them in their summer's growth.

In this shifting I always shake off the whole of the ball of earth, and cut off all the roots that are of a black colour, carefully preserving such only as are white and strong. I then put such plants as are intended to fruit the next season into second-sized pots with fresh mould entire.

The bed at this time should be renewed with a little fresh tan, in order to promote its heating, and the pots plunged therein immediately. The hot-house should be kept pretty warm till the heat of the tan begins to arise, as it will be the means of causing the plants to strike both sooner and stronger. As soon as the heat of the bed begins to arise it will be proper to give the plants a sprinkling of water over their leaves; and as soon as they are perceived to grow, they will require a little water once a week for a short time, and afterwards twice a week till the next time of shifting them in their pots.

During the summer months give the plants plenty of air whenever the weather is warm, and water properly, as has been described: let the pots be kept in a regular constant heat; and clean from weeds; but above all, avoid an over-heat of

the tan. Some persons plunge a thermometer in the tan, with the ball of its tube as deep as the bottom of the Pine pots ; and by repeated observations, a point is fixed for the spirits in the part of the tube above the surface of the tan, to show when the pots should be raised. Whether the above, or the putting *watch-sticks* in the tan (which is the most common method) is practised, too much attention cannot be had whenever there is the appearance of too violent a heat in the tan.

If the above directions are strictly attended to, the plants will be grown to a large size by the beginning of August ; when they should be shifted into the largest-sized fruiting pots, with their roots and balls entire.

But it will be proper here to observe, that in some hot-houses it is found difficult to get plants of the Antigua and Sugar-loaf kinds to fruit at a proper age ; and, in that case, I advise the shaving off the roots on the outside, and reducing the balls of *them* at this shifting. A greater proportion of sand should also be added to the compost, which will be the means of bringing them into a fruiting state at a proper season.

The disproportion of the second-sized and fruiting pots is so great, as to admit of a good quantity of fresh mould at this shifting, which is absolutely necessary to support the plants till their fruit becomes ripe : it also affords an opportunity of performing the operation of shifting the plants without injuring their roots. As there will be a large

space between the ball and the side of the pot, the mould may be put round the ball with great ease. Whereas, when plants are shifted into pots, only a small size larger than those from whence they were taken, they are generally much injured by the operation of shifting : besides, even with the greatest care, there will frequently be spaces left hollow between the ball and the side of the pot.

A little fresh tan should be added, and the bed forked up, but not to the bottom of the pit, as the tan is liable to heat violently at this season of the year ; of which when there is the least appearance, the pots should be raised immediately. The delay of doing it one day may be attended with very bad consequences.

The plants will continue to grow very fast this and the following month, and should therefore be watered pretty plentifully, at least twice a week ; and, in the summer waterings, it should be observed, that it will be of great service to the plants to be watered once a fortnight all over their leaves. If the month of October be wet and cold, the plants should not be watered above twice in that month ; but if fine and clear, once a week : and here ends the watering of the fruiting plants for the season. I never give them any water in the months of November and December ; and during that time I keep the hot-house in a cold state, but a bottom heat is always required ; therefore the tan should have been renewed, and the old part of it screened about the end of October or beginning

of November : from which time the bed will generally retain a moderate warmth till the beginning of January, when the tan should again be renewed. From that time the hot-house should be kept a few degrees warmer, and, as soon as the tan begins to ferment, the plants may have a little water given them.

In this month (January^c) some of the plants will appear set for fruiting, which may be distinguished by the short leaves in their centres ; and from that time they should be moderately watered (till the middle of March) and the hot-house should be kept pretty warm ; a little air should, however, be admitted, whenever the weather will permit.

About the middle of March it will be proper to renew the tan-bed, and, at the same time, the plants should be divested of a few of their bottom leaves ; the mould on the top of the pots should be taken off as deep as can be done without injuring the roots, and the pots filled up with fresh compost earth, which will add to the vigour of the plants, as well as give a neatness to the whole when finished.

^c In some hot-houses, and in some seasons, the plants will form themselves for fruiting in December ; and when that is the case, the house should from that time be kept a few degrees warmer, viz. the spirits in the thermometer should be kept up to the point marked *temperate*, or, in general, one or two degrees higher : for when plants are kept *too cold* at that critical season, (viz. the time of forming their fruit) it generally causes many of them to show crooked, imperfect, and mis-shapen fruit.

It is very injurious to the plants, and greatly retards the swelling of the fruit, to remove them after this season ; therefore, in case the heat of the bed should decline, a fresh heat may be got without moving the plants, by taking out the tan betwixt the pots as deep as possible, and filling that space up with fresh tan. — This method is practised by some even at an earlier season.

The plants at this season will demand a kind lively bottom heat ; and whenever the weather will permit, a great quantity of air should be admitted into the hot-house, the want of a due proportion of which would cause the stems of the fruit to draw themselves weak, and grow tall, after which the fruit never swells kindly.

As the fruit and suckers begin to advance in size, the plants will require plenty of water to support them, which may be given them at least twice, and sometimes three times a week ; but too much should not be given them at one time ; it is better to give them less at a time, and oftener.

Sticks should be provided to support the fruit before it is grown too large ; and, in tying them, care should be taken to leave bandage-room sufficient, making allowance for the swelling of the fruit.

When the suckers are grown to about one foot in length, they should be taken off in the same manner that has been described ; and from that time the fruit will swell very fast. As soon as the fruit appears full swelled, the watering such plants

as produce them should cease : but it is too general a practice (in order to have the fruit as large as can be got) to continue the watering too long, which causes the fruit to be filled with an insipid, watery, and ill-flavoured juice.

It is easy to know when the Pine becomes ripe by its yellow colour ; yet they do not all change in the same manner, but most generally begin at the lower part of the fruit. Such fruit should not be cut till the upper part also begins to change, which sometimes will be many days after, especially in the Sugar-loaf kinds. Sometimes the fruit will first begin to change in the middle, which is a certain indication of its being ripe : such fruit should be cut immediately.

Having thus laid down the culture of the Pine-apple plant, whether raised from seed, by crowns, or suckers, to its final perfection in the fruit, I shall now subjoin some hints and observations, most of which, I hope, will be of use.

In treating of the culture of the Pine-apple plant, some persons have recommended the shifting of the plants from first to last, with their balls entire ; also the shifting of them oftener than I have here recommended. These methods I disapprove, for the following reasons :

First, it is observable that the Pine-plant begins to make its roots at the very bottom of the stem ; and, as the plant increases in size, fresh roots are produced from the stem, still higher and higher ; and the bottom roots die in proportion : so that, if

a plant in the greatest vigour be turned out of its pot as soon as the fruit is cut, there will be found at the bottom a part of the stem, several inches in length, naked, destitute of roots, and smooth. Now, according to the above method, the whole of the roots which the plant produces being permitted to remain on the stem to the last, the old roots decay and turn mouldy, to the great detriment of those afterwards produced.

Secondly, the first ball, which remains with the plant full two years, by length of time, will become hard, cloddy, and exhausted of its nourishment, and must therefore prevent the roots afterwards produced from growing with that freedom and vigour which they would do in fresher and better mould.

Thirdly, the old ball continually remaining after the frequent shiftings, it will be too large, when put into the fruiting pot, to admit of a sufficient quantity of fresh mould to support the plant till its fruit becomes ripe, which is generally a whole year from the last time of shifting.

It is an object of emulation amongst gardeners to try to excel their neighbours in the size of their Pines. In order to produce very large fruit, I recommend the following method, which I have often practised with great success.

In the month of April or May, it is easy to distinguish, in a stove of Pines, which plants promise to produce the best fruit: this is not always the case with the largest. A few of the most promising

being marked, a small iron rod, made with a sharp angular point, may be thrust down the centre of the sucker, which, being turned two or three times round, will drill out the centre, and prevent its growing. This must be performed on all the suckers as fast as they appear. Thus the plant being plentifully supplied with water, and having nothing to support but the fruit, will sometimes grow amazingly large. But this method should not be practised on too many plants, as it is attended with the entire loss of all the suckers.

A yet further advantage may be given to the swelling of the fruit, by having a few of the lower leaves of the plant taken off, and by putting a rim of tin, or any thing else in the form of a hoop, round the top of the pot, sufficient to raise the mould three or four inches.

The mould should be of the best quality, and constantly kept in a moderate moist state: this may be done by having the surface kept covered with moistened moss. The roots of the Pine-plant, especially those produced from the part of the stem just under the leaves, will then make a surprising progress, and the fruit will be greatly benefited by this expedient.

Here it may be necessary to observe, that both the growth and size of Pines depend much on the construction and condition of the stove in which they are cultivated. In many places small stoves of a particular construction (in the which the Pines stand very near the glass) are erected solely for

the purpose of *Fruiting-houses*. These, from their being always kept up to a high degree of heat, are by gardeners usually termed *Roasters*. See Plate 1. When there is such conveniency, it is customary, when any Pine-plants show fruit in the large stoves, to remove such plants (especially the most promising) directly into the fruiting-house; where, from the high degree of heat kept, they generally swell their fruit astonishingly.

It is observable that Pines always succeed best in stoves that have been newly erected; on which account some of the more curious in the cultivation of this fruit have judged it expedient to pull down and rebuild their Pine-stoves every ten or twelve years. Although I cannot subscribe to such expensive mode of procedure, I shall here beg to state the many advantages that accrue from keeping Pine-stoves in good and proper repair.

First, by keeping the flues clean from soot, and air-proof, they will heat the house better, and much less fuel will serve.

Secondly, by a due attention to keeping the inside of the roof, &c. duly painted, and by constantly white-washing the walls and flues in every part of the house, the plants will be greatly benefited, both from having a better reflection and from cleanliness.

A further advantage in stoves newly built may also here be remarked. Where tan only is used, the beds are always filled at the first with new tan

entire ; but afterwards constantly with new and old tan intermixt.

Lastly, it is probable that stoves, newly erected, derive their greatest benefit from the good condition of the glass-work ; for, however well it may be kept in repair afterwards, it is certain that there never is so much light in an old stove as was at the first. Dirt will find its way into the cavities between the squares, &c. which, obstructing the sun's rays, darkens, and gives a gloominess to the stove.

It sometimes happens that great part of a stove of plants will show their fruit at or near the same time, and with the same treatment, would consequently become ripe too nearly together. To prevent this, and bring them into a regular succession, when the fruit is nearly ripe, part of the plants may be taken out of the stove and set in a dry shady place ; as for instance, the stove-shed, where the pots should be covered with moistened moss, but no water given them : it must be observed, that every one of the plants must be taken into the hot-house again, and set in the tan-bed for a week or ten days before the fruit is cut, to give it a good flavour. When there is a variety of hot-houses, this caution is not necessary.

Large fruiting plants will sometimes show their fruit in the months of August and September, but these are generally thought of no value, and consequently thrown away. To prevent this, I frequently take such plants out of the hot-house as

soon as their fruit begin to appear. I then set them in a shed or out-house for five or six weeks ; at the expiration of which time I pot them as in the month of March, after shaking off their balls. After this I plunge them into the tan ; and in the month of March following put them into larger-sized pots, with their balls and roots entire. By this means I have sometimes cut tolerably good fruit from such plants in the months of May and June following. Such forward plants generally produce very fine suckers.

Whenever the Pine-plants are removed after they are grown large, it will be of service, before they are taken out of the tan-bed, to mark the side of the pots which stands next the sun ; for it is observable, that the centres of the plants generally tend that way : so that the plants, when replaced, may stand as they did before they were removed. I do not mean that it is at all necessary for the plants to be put into the very identical places in which they stood before, but in point of position it will be proper, and the plants will be benefited by being so placed. This may as easily be done as placing them in a random manner, which is the common method.

Besides the watering of the Pine-plants in the manner recommended, it will be of great use to them during the summer, if the walks and flues of the hot-house be frequently watered : this should constantly be done in very warm weather, and always late in the evening ; the glasses should be

immediately closed. The great heat of the hot-house will exhale the moisture, and raise a kind of artificial dew, which will soon stand in drops on the glasses ; the leaves of the Pine being succulent, they will imbibe the watery particles, to the great benefit of the plants.

It will also be of great use to give the top of the tan-bed frequent waterings during the summer, in order to keep it in a moist state ; for when the tan becomes dry and husky, the Pine-plants never make any great progress. The water may with great ease be put upon the tan between the Pine pots by the help of the watering-pipe. When the tan is in a moist state, it not only affords a more generous warmth to the plants, but (the pots being porous) their roots also imbibe a constant moisture, which is far preferable to any waterings that can be given them.

Insects excepted, no greater misfortune can befall a stove of Pines than an overheat of the tan ; for, notwithstanding all the care a gardener can bestow, when this happens, the plants are generally injured in a greater or less degree. It used to give me much concern, during the time I used nothing but tan, that no effectual means could be found to remove so great a grievance : but by substituting oak-leaves in the place of tan, this mischief is absolutely annihilated. I shall therefore give my readers the method of using them at the end of this work. However, as oak-leaves are not to be got in sufficient quantities in all places

where there are hot-houses, I have, in this treatise, considered every part, and adapted it as if tan only were used: it therefore becomes necessary for me to add, that the stated times already laid down for renewing the tan, together with the renewal of it as often as it becomes cold, should be carefully and diligently attended to. However, the goodness or badness of the tan and the season will ever make those times uncertain.

On Compost Mould proper for the Pine-apple Plant.

PROPER compost mould for the Pine-plant is a very important article, and in the course of my practice I have long endeavoured to discover in what kind of compost it will grow with the greatest vigour; and after numerous experiments made with mixtures, of cows, deer, sheep, pigeons, hens, and rotten stable-dung, with soot, and other manures, in various proportions, with fresh pasture soil of different qualities, I can venture to recommend the following:

In the month of April or May, let the swarth or turf of a pasture, where the soil is a strong rich loam, and of a reddish colour, be pared off, not more than two inches thick: let it then be carried to the pens in sheep-pastures, where sheep are frequently put for the purpose of dressing, which places should be cleared of stones, &c. and made smooth; then let the turf be laid, with the grass side downwards, and only one course thick; here

it may continue two, three, or more months, during which time it should be turned with a spade once or twice, according as the pen is more or less frequented by the above animals, who, with their urine and dung, will enrich the turf to a great degree, and their feet will reduce it, and prevent any weeds from growing.

After the turf has laid a sufficient time^d it should be brought to a convenient place, and laid in a heap for at least six months, (if a twelvemonth it will be the better,) being frequently turned during that time ; and after being made pretty fine with a spade, but not skreened, it will be fit for use.

In places where the above mode cannot be adopted, the mixture may be made by putting a quantity of sheep's dung (or deer's dung if it can be got) and turf together. But here it must be observed, that the dung should be collected from the pastures when newly fallen ; also, that a larger proportion should be added, making an allowance for the want of urine.

1. Three wheelbarrows of the above reduced swarth or soil ; one barrow of vegetable mould from decayed oak-leaves, (as described in the end of this work,) and half a barrow of coarse sand, make a compost mould for *Crowns*, *Suckers*, and *Young Plants*.

^d I generally let it lie in the pens till the quantity of sheep's dung constitutes nearly one third part.

2. Three wheelbarrows of swarth reduced as above, two barrows of vegetable mould, one barrow of coarse sand, and one fourth of a barrow of soot, make a compost mould for *fruiting plants*.

The above composts should be made some months before they are wanted, and very frequently turned during that time, that the different mixtures may get well and uniformly incorporated.

It is observable, that in hot-houses, where Pine-plants are put in a light soil, the young plants frequently go into fruit the first season, (and are then what gardeners term *runners*); on the contrary, where plants are put in a strong rich soil, they will continue to grow, and not fruit even at a proper season: therefore, from the nature of the soil from whence the swarth was taken, the quantity of sand used must be proportioned; when the loam is not strong, sand will be unnecessary in the compost for young plants.

I conceive that the *urine* of sheep contains a greater quantity of mucilage, or oleaginous matter, than the *dung* of those animals: and this opinion is founded upon observations made in sheep pastures, where, during the summer months, the effects of both are easily distinguished. I also presume that the reduced swarth in the pens receives a very considerable degree of fertility from the feet of the sheep.

Where oak-leaves are not used in hot-houses, the vegetable mould may be made by laying a quantity of them together, in a heap sufficiently

large to ferment, as soon as they fall from the trees: they should be covered for some time at first to prevent the upper leaves from being blown away. The heap should afterwards be frequently turned, and kept clean from weeds: the leaves will be two years before they are sufficiently reduced to be fit for use.

I shall just observe, that it will be proper to keep the different heaps of compost at all times clean from weeds, to turn them frequently, and to round them up in long rainy seasons. If covered, the better: but they should be spread abroad in continued frosts and in fine weather.

On a due Proportion of Air proper for the Hot-House.

It is from a due proportion of air admitted into the hot-house, that the goodness of the Pine-plants in a great measure depends. The want of it will cause them to grow with long leaves and weak stems, which plants never produce good fruit.

On the other hand, air admitted in too great a quantity, or at improper seasons, will starve the plants, and cause them to grow yellow and sickly.

In the winter months, during the time that the plants are nearly in a state of inaction, the hot-house will require very little air; yet it will be absolutely necessary to take every favourable opportunity to let out the foul air, and dry the house:

and the letting down the glasses a little way, even for a few minutes in the middle of the day, will sometimes do that business, especially when there is a little sun, and some wind. At this season there is not the least necessity to have regard to the words *give air* on the thermometer, for a little air may safely be admitted, although the spirits should not rise higher than six or eight degrees above the point *temperate*.

But during the summer, when the weather is warm and fine, air should be admitted very plentifully. It will cause the plants to grow with broad leaves, and their stems will be stiff and strong, provided proper room be given them in the bed. Such plants generally produce large well-swelled fruit.

In many places it is customary to shut up the hot-house at six o'clock in the evening, let the weather be ever so warm and fine, that business being frequently left to the care of labourers, who leave their work in most gardens at the above hour. In the months of May, June, and July, the sun has great power in an evening after the above hour; when, if the house has no air, the heat in it will soon be raised to such a degree as to cause the plants to grow tall and weak, and prevent the fruit from swelling.

In a hot season I frequently let the hot-house have air during the whole night, and sometimes for many weeks together. But when this is done, the glasses should be left in such a manner as to

prevent the rain, in case any falls, from coming on the plants.

It has been thought advisable by some to construct hot-houses in such a manner as that air might be admitted by the back wall; while others have been of opinion that it acquired a more beneficial temperature by being conveyed through a green-house into the hot-house. To the first method I object, upon account of the northern quarter from whence the air immediately comes: and to the last, on account of its passage through the green-house, which I conceive may affect its purity. I do therefore recommend, in preference to all other contrivances, the admission of air between the glasses immediately over the plants.

General Observations on watering the Pine-apple Plant.

FROM the stated times already laid down for the watering of the Pine-apple plant, a person not well skilled in its management might be led into an error, in regard to the proper quantity that ought to be given. Therefore it becomes necessary for me to say something more upon this head.

In the first place, I disapprove of ever giving a great quantity of water *at one time* to the Pine-apple plant in any stage, or at any season; if too much is given, it will cause the mould in the pot to run together, after which, when it be-

comes dry, it will be hard and cloddy, and therefore not so well adapted to encourage the progress of the roots of the plant: besides, the glutting a plant with water will rob it of its vigour, and, if practised long, will reduce it to a weak state.

The Pine-apple plant is of a succulent nature; and although it will dispense with a pretty moderate quantity of water in the summer, when large and vigorous, yet it does not suffer, like most other plants, by being kept *too* dry. Young plants, especially in the hot part of summer, if kept in a dry state, will not appear to make any progress; yet, if there is a bottom-heat, their roots make great advances, and the plants always grow very fast after being in such a state, whenever water is given them; therefore, though the keeping plants *too* dry is certainly an error, it is not attended with the same fatal consequences as the contrary practice. It is my wish, however, to give such directions as may enable a person to avoid either extreme.

We are informed, that in some of the West India islands, where the Pine-apple plant grows in great perfection, no rain falls in the summer for many months together; therefore this plant is supplied with moisture from the dews only, which we are told fall copiously. The method I have recommended of watering the walks and flues, &c. of the hot-house in an evening, in order

to raise a kind of artificial dew, is in imitation of these natural waterings. The frequent gentle summer-waterings recommended in the foregoing work, are also founded on the same principle; therefore theory, as well as practice, determines that method to be the most eligible.

Plants lately shifted into the pots, till their roots get matted, do not require so much water as before their shifting.

Plants that are in large-sized pots, in proportion to the size of the plants, do not require so much water as plants that are under-potted.

Plants that are in hard-burnt pots, made of strong clay, do not require near so much water as plants in pots less burnt, and made of clay with a good proportion of sand intermixed. The latter are greatly to be preferred.

Plants in a vigorous growing state require very frequent and gentle waterings.

But plants with fruit and suckers upon them, require most of all.

When plants are watered over their leaves, it should be sprinkled upon them only till every part is made wet, which may easily be distinguished, as the water immediately changes the colour of them to a sad green. As the leaves stand in different directions, the best method is to dash the water upon them backwards and forwards, on every side of the bed.

Summer-waterings should always be given late in

an evening ; but in the spring and autumn, the forenoon is the proper time.

Less water should be given in moist than in dry weather, for reasons already given.

In winter, when water by accident falls into the centres of the fruiting plants, it should immediately be drawn out, which may easily be effected by the help of a tin pipe, of about three feet in length, one end of which should be no bigger than the small end of a tobacco-pipe.

On Water proper for the Pine-apple Plant.

THE quality of the water used in the hot-house is of considerable importance. In many places, hot-houses are supplied with well-water, which is generally put into a cistern three or four days before it is used. Pond, or river-water, is preferable, and is generally chosen for the above purpose, where it can be had with conveniency ; but the supply that a hot-house requires is attended with much trouble and great expense.

It must be allowed that the water which falls from the heavens is preferable to any other : there is something in rain-water peculiarly adapted to promote vegetation. It seems to contain the food of plants, which it gets in its passage through an atmosphere loaded with putrescent particles.

All hot-houses may so easily be supplied with rain-water, that it seems strange an object of so

much importance should hitherto have been so little attended to.

The water which falls on the roof of a hot-house is in most seasons sufficient at least for the Pine-plants contained in it : I say in most seasons, for the quantity collected from the dews in dry weather is almost incredible : whether it proceeds from the exhalation arising from the frequent waterings in the hot-house, in which case the same water may possibly be used several times over, or whether the great heat in the hot-house attracts the watery particles floating in the open air during the night, are points that I shall not take upon me to determine.

When a hot-house is building, by bestowing a very trifling additional expense, (which will save a continual one afterwards,) the rain that falls on the roof may be brought into a cistern placed in any part of the building.

When this is intended, it will be necessary to have a course of stone project in front nine inches beyond the wood plate that supports the roof ; which stone should have a groove cut in the middle, five inches in breadth, and the depth of the groove at the beginning should be half an inch, increasing one-eighth of an inch in every yard in length. This is a good proportion. The groove will receive the water that falls on the roof, and if worked in the above manner, the water will descend to one end of the stove if small ; but if the hot-house be large, it will be more convenient to descend from

both ends to the middle, where a semi-circular stone, one foot in diameter, worked in the form of a bason, should receive the water. This stone must have a hole cut at the bottom, into which a leaden pipe should be fixed, which will take the water from thence to any part of the hot-house under the level of the stone.

The large hot-house at Welbeck is thus contrived; so that all the rain that falls upon its roof, which contains above three thousand square feet, is brought at pleasure into a large cistern in the front-bed in the middle of the stove.

I should have observed, that the groove in front is covered with lead; likewise, that there is a waste-pipe in the cistern to take off the water when the cistern is full; also, that a small plug prevents the water from coming into the cistern, when not required; and that the cistern is sufficiently large to contain a reserve of water against dry weather.

On Fire proper for the Hot-house.

It would be so difficult to keep the Pine-apple plant in any part of this island, throughout a severe winter, without the assistance of fire, that I believe I do not assert too much when I say it would be impossible: but at the same time that fire is absolutely necessary, the moderate use of it will be found equally so.

Coal is the most general fuel used in hot-houses, although peat, turf, or wood, will answer the pur-

pose as well ; but fires made with the latter require a great deal more attendance.

In the months of October, November, and great part of December, the hot-house will require very small fires, as I already have observed. The advantages of keeping the stove in a cool state during that part of the season are very apparent. A moderate fire made in an evening will then be quite sufficient ; and when it begins to burn pretty brisk, it will be proper to cover it over with ashes taken from under the grate, (supposing the fire made with coal,) which will cause it to give a moderate heat through the greatest part of the night, provided the external air be well excluded from the fire-place, which is a point essentially necessary to be observed. And if the morning should be severe, no danger need be apprehended if the spirits in the thermometer be up within two or three degrees of the point marked *temperate*.

In the months of January and February, stronger fires will be requisite, as the Pines then demand a kinder treatment : but I shall here observe, that then, as well as at all times, be the weather ever so severe, it will be imprudent to make excessive strong fires : excess of fire cracks the flues, and causes them soon to go out of repair, after which the same quantity of fuel will not have the same effect ; besides, when once the flue becomes cracked, it will admit the smoke into the house, to the great detriment of the plants contained in it.

In order to preserve the flues, there should always be a sufficient number of fire-places, by which means the fires need not at any time be made so strong. When the roof of the hot-house is covered, one fire will suffice for about seven or eight hundred square feet ; but where no covering is used, it will not give a proper heat to more than five or six hundred feet : so that the number of square feet contained in a hot-house being known, the number of fire-places required may be easily ascertained.

Some persons who give designs for the building of hot-houses, allow a fire to work a much larger space than I here recommend, in order to make it appear that the expense in fuel will not be so great ; whereas, in fact, the case is quite the reverse ; for I can venture to assert, that one fire worked violently, will consume more fuel than two that are worked moderately ; the latter will also heat the house more regularly, and never be productive of the bad effects which attend the former, as I have already shown.

Hot-houses that are new built, require much less fire than those that are old, and consequently in worse repair : in the former there is seldom occasion for the fires to be continued longer than the beginning of May, yet there are sometimes instances of fires being requisite, even in the summer months ; not only in respect of the weather, but in order to promote the ripening of late-shown fruit.

Fuel is often burnt in stoves without effect, by the improper construction of the fire-places^e: it is a common thing for stove-fires to return back when the wind is in certain points; but the means of preventing this are very easy. Smoke is a fluid, and acts on the same principles as water; but their disproportion of gravity, (considered with

^e Mr. Joseph Thompson, gardener to the Right Hon. Lord John Cavendish, at Billing, in Northamptonshire, has obligingly favoured me with the following important account of a method of burning lime in stove fire-places. — It will, I trust, prove a valuable piece of information, more especially to persons situate in a lime-stone or chalk country, and where coal abounds. When lime is of a fattening quality, the acquisition will be still greater, not only by way of contributing to improve the quarters in kitchen-gardens, but also by its being possessed of powers capable of destroying snails, slugs, &c. with which most old kitchen-garden grounds abound.

“ Agreeably to my promise, I now send you herewith an account of our method of burning lime in the stove fire-places, together with a plan of the kiln sketched out with a pen, which I have endeavoured to explain by references.

“ The size of the kiln should vary according to the quantity of lime required, and the heat that may be needful for Pine-stoves or forcing-houses, &c. — Ours here is somewhat larger than the dimensions given, and by working only at nights and mornings, will burn four bushels of lime per day. This takes $\frac{3}{4}$ hundred of coals, which, with us, costs 1s. But as Lord John Cavendish does a great deal of building here, and as the workmen consider the lime thus burnt greatly preferable to any we can get, (when we buy our lime it is brought five miles, and costs 3s. 6d. per quarter,) I have frequently had occasion to burn lime in a hot season when fire-heat has not been required in our forcing-houses.

that of common air,) naturally makes their directions tend differently.

We know, that if a pipe filled with water be placed in an exact horizontal position, both ends

“ I have made the following observations in regard to the profits attending this mode of practice.

	s.	d.
To digging one load of stone - - -	0	3½
To carriage of ditto - - - -	1	6
To coals to burn the above - - -	8	8
To a boy 10 days' work at breaking the stone, attending the fires, and doing other jobs, }	5	0

	15	5½
To 5 quarters of lime, worth - - -	17	6
	2	0½

“ Here is, you will observe, a small balance in favour of this mode of practice, exclusive of ten days' fire-heat in our forcing-house. And this was done when I only worked the kiln at nights and mornings; but when we work it all day, by letting the lime out at the sliding grate, and by adding coal and stone at the top, we can then burn a quarter in a day, and the boy can manage to break stone and coal, and attend the kiln, without any other assistance. Besides, there is another advantage when we burn all day; for the kiln, by becoming red hot, limes the stone more rapidly, and I judge that 1-5th less coals will do the last case.

“ I shall beg to observe, that we abound in lime-stone here; but in this inland part of the country, coal is a most expensive article.

“ I have never heard of any other kiln of this kind in England. Lord John told me it was practised at Lady E. Ponsonby's, at Bishops Courts, in Ireland.

“ BILLING, *Jan. 1794.*”

being open, the water will run out gently each way ; but if a vessel filled with water be elevated, and fixed to one end of the pipe, the water will run out at the other end with a rapidity proportioned to the elevation of the vessel.

The case is similar ; the flues in hot-houses are carried a great length from the fire-place in a horizontal position ; and when the fire-place (which is frequently the case) is too near the level of the flue, the fire will necessarily return back when the wind is in certain points. To prevent this, the fire-grate should be placed two feet below the level of the bottom of the flue ; and eighteen inches being a proper depth for the fire-place, the top of the fire-place will be six inches below the bottom of the flue, which will be sufficient to give the fire a good draught. — Fire-places constructed in this manner I have never known to fail, but have found them draw well at all times, and in all seasons.

On steaming of the Pine-stove, &c.

THE method of steaming of Pine-stoves and forcing-houses seems to stand forward among the modern improvements of gardening.

The powers of steam are certainly astonishingly great, and have been found of wonderful utility in the line of mechanic arts ; but it is exceedingly doubtful whether the use of steam in Pine-stoves and forcing-houses will be possessed of so many advantages, and turn to so good account, as some

of the more sanguine among modern projectors have estimated.^f

^f EXTRACT from the GENERAL EVENING POST, from November 22d — 24th, 1792.

“ A Gentleman, who is eminently distinguished for his mechanical talents, and his improvements in several branches of rural economies, has lately contrived to rear pine-apples, melons, and other hot-house plants, without the use of tan, or other fermentative mixture, the necessary heat being communicated by steam; and after having practised it for at least two years, he can now, with some degree of confidence, pronounce, that it has even exceeded his highest expectations, and is in several respects preferable to any mode hitherto practised for any hot-house plants, particularly in respect to insects; for he does not find that any one class of insects has ever since attacked any of the plants that have been reared after this new method.

“ The circumstances that led him to the discovery, was the difficulty of finding tan in his particular situation. Chagrined at this, he began to reflect if it might not be possible to do without it. It readily occurred to him, that heat and moisture are the two great agents in promoting vegetation, and he thought, if these two could be conjoined together, it could not fail to prove salutary. Steam, properly managed, seemed to promise to do this. He then contrived an apparatus, by which water can be kept properly heated to transmit steam; and this steam so managed as to be capable of acting either by its heat only, or by its heat and moisture united, as circumstances should indicate to be proper; by means of flues, either horizontally disposed under a bed of earth, or in a perpendicular wall, both the soil in which the plants grow, or the wall to which they are nailed, can be heated to any degree wanted; and by admitting the steam itself at pleasure, either in the body of the mould, or in the hot-house, the plants may be subjected to a heated bath, if you please so to call it, which appears, by the experience he has of it, to be wonderfully kind to

The extravagant idea of steam answering every purpose of both fuel and tan, in regard of heat, I believe on trial proves merely an ideal projection.

A genial warmth and moisture happily combined generally prove salutary to vegetation; but excess of steam in hot-houses has by experience been found prejudicial both to the Pine and the Vine.

Steam in pine-stoves and forcing-houses may be found useful when used with care and judgment. In my own opinion its greatest use will be in counteracting the parching and violent heat we often experience; sometimes arising from the excess of heat in the flues, and sometimes from a powerful sun-heat and dryness of the weather; but oftener by these causes in conjunction, in a season when the nights prove frosty and the days warm and dry.

I have not heard of more than two instances where steam has been adopted in Pine-stoves on the general plan of affording heat and moisture both to the tan-bed and the body of the stove.[§]

vegetation. The whole plant comes to be moistened with a warm vapour, which wholly condenses into a dew, that seems to penetrate every part of the leaf, and confers an invigorating freshness to the whole plant, that nothing else could have effected.—It is impossible to conceive any thing more beautiful, luxuriant, and fruitful, than the Vines reared by this mode of management.”

§ In the first, steam is, by means of a perforated arch, conveyed under the bottom of the tan-bed. In the second it is conveyed by steam-pipes to various parts of the stove. See *Plate III.*

I have been informed that, in both, the event proved unsuccessful, and that the practice has been discontinued.ⁿ

It is natural to suppose that in a constant excess of moisture, both in the tan-bed and body of the stove, the Pine-plants would decrease in their vigour, and their leaves soon become of a yellow hue; that the Vines would produce shoots weak and long-jointed; and that the bunches of grapes would be constantly subjected to decay. However, by a moderate and judicious management, the steam-pipe may prove advantageous to forcing-houses in general; and the method is simple and easy.

To the boiler, which is usually placed in the back shed, a tube or pipe must be affixed, and which must be conveyed through the back wall into the stove. From this tube or pipe, others of smaller dimensions should branch out, and be conveyed in a horizontal position to any part of the

ⁿ Although the method of conveying steam under the tan-bed does not appear to answer for the culture of the Pine; still it is very likely to prove an eligible expedient for forcing some kinds of early vegetables, &c. that are less impatient of moisture. — Thus we see cucumbers, melons, kidney-beans and early potatoes (with many other articles in the line of forcing) grow luxuriant, and flourish best in a hot-bed heat where there is a constant and strong steam. Hence, this method may prove advantageous to gardeners situate in places where early vegetables sell at a high rate. On this consideration I shall subjoin herewith a plan exhibiting the method of performing this new mode of practice.

stove. Running round the bark-pit is generally deemed the most convenient. To these horizontal pipes must be affixed a few perpendicular ones of yet smaller dimensions; each of which must have a plug.

When steaming is required, you heat the boiler in the shed behind the stove; then take out the plugs from the perpendicular tubes, and you steam the stove in a few minutes to any degree required.

It may be necessary to remark, that great care should be had in supplying the boiler with water; because, if permitted to boil dry, it would endanger its breaking by having cold water put into it while it remains in a hot state.

On the Covering of the Hot-house.

THE covering of the glasses in a hot-house is not absolutely necessary, even in our severest seasons: yet where the whole of the glasses are covered during the winter nights, much less fuel is required than in other hot-houses where there is no such convenience: however, the saving in fuel is far from being adequate to the expense attending the covering; for, besides the first expense of the covers, and the daily one in putting them on and taking them off during the winter season, we find, by experience, that more glass is broken thereby than by every other accident. But here it may be said, that glass is also frequently broken

in hot-houses that are not covered, by the severity of the weather : this I grant is often the case when the squares of glass are large, and when the glazing-work is injudiciously performed. We know that thin window-glass (such as is used for hot-houses) is an elastic body, and that its elasticity increases and decreases in proportion to the temperature of the air.

The method of glazing in lead is now exploded ; and what glaziers term *slate-glazing in putty*, is most generally adopted.

When squares of glass are cut of a large size, they are generally cast or warped ; therefore, it is a practice with glaziers to tack them down with small tacks or sprigs, in order to make the work look neat. The glass bears this confinement during the time the weather is warm ; but in a hard frost the squares so strained frequently break.

The squares for a hot-house, where covering is not intended, should not be larger than 8 by 6 inches ; and the groove in the wood-work to receive them should be 5-8ths of an inch deep, which will admit of their being put in, without straining them in the least from their natural form ; they will then withstand the severity of the weather without danger. Added to this, there is a great saving in point of expense, by having the squares of glass of so small a size, for the price of glass varies according to the different size of the squares : besides, as each square, when put in with putty, has

a bearing on two sides only, small squares must consequently be the strongest, and therefore the less liable to be broken.

In this place I must not omit taking notice of the common erroneous method of putting in the squares of glass, which is to let them lap over each other at least an inch, and in some hot-houses an inch and a quarter, whereas $\frac{3}{8}$ ths of an inch is found quite sufficient to keep out the rain that falls on the house, which will not only make a saving in glass, but is better in other respects; for the cavity between the squares soon gets filled with dirt; and so broad a space between each square being darkened, contributes to give the house a gloomy appearance. Besides, the water that lodges between the squares in the winter is apt to freeze, in which case it expands, and thereby frequently causes the squares to break.

As glass is now become the principal object, in point of expense, in the building of a hot-house, I flatter myself that what I have advanced on this head will not be esteemed an unnecessary digression.

Many small hot-houses have for their covering a large sheet of canvass, which, by the help of a roller and pullies, is moved up and down with great ease. This is an expeditious method of covering, and may be of great use on the approach of a large hail-storm, though instances of damage done this way rarely occur.

But where hot-houses are large, this mode of

covering cannot so well be adopted ; therefore the most general method is to use light covers of wood, or frames of wood, covered with painted canvass. The covering the whole of the roof of a hot-house in this manner is very troublesome, and attended with great expense ; nor indeed is it absolutely necessary, as I have observed above.

When either of the above methods are practised, it should be done with discretion. In many places the covers of the hot-houses are sometimes, in a snowy, dark, severe, or rainy season, permitted to remain on for many days together, which is very detrimental to the plants, as they will in time draw themselves weak by the continuance of such a practice : for it is observable that plants grow much faster in the dark than in the light ; and this is manifest from the progress of plants when first they arise from seed, in the open ground, in the spring of the year, when they do not grow half so much in the day as in the night. But here it must be observed, that the sun and light give maturity to the nightly progress of plants ; and the want of them soon causes the plants to grow languid, weak, and, in time, to die.

It is also a bad practice to continue to cover hot-houses late in the spring of the year, which is injudiciously done in many places, even so late as the middle of the month of May : for, as the covers are seldom taken off till after six o'clock in the morning, (the hour that labourers come to their work at most places,) it makes the hot-house night

too long at that season of the year, when generally there are great numbers of the fruit of the Pine in blossom : for it should be remembered, that *light*, as well as *warmth*, is essentially necessary to promote the growth of plants.

In large double-pitted hot-houses the covering of the lower lights may be effected with great ease ; and this is found to be of use on a double account ; first, because the Pine-plants in the front pit, by standing very near the glass, are in the most need of covering in severe weather ; and, secondly, because the front pit is generally used for succession plants, which require to be shaded, after being shifted in the spring, whenever the weather is warm and clear, as I have before observed in treating upon that head.

There is yet another mode of covering, which in this place merits our consideration, viz. the screening of the hot-house from the violence of the sun in very hot seasons.

I have already observed, in the former part of this work, that the fruit of the Pine, (particularly the kind called the Queen Pine,) in the middle of summer is subject to crack in the middle ; and when that is the case, it generally contains a very insipid watery juice.

It is evident that this imperfection proceeds from the too violent heat of the hot-house in the middle of summer ; for we find that later in the season they never have this defect : for the juice in the Pine decreases with the length of the days ;

so that late in the season its fault is generally that of being too dry.

It is observable, too, that the young, or succession Pine-plants, do not make half the progress in violent hot weather, in the middle of summer, that they do later in the season.

In order to obviate the above inconveniences, some persons cover their hot-houses in the middle of the day, when the heat of the sun is violent, with bass-mats fastened to a rope, which may be moved up and down with great ease. But a better mode, and which is frequently practised, is, to cover the glasses with a large net, which admits the air to pass freely, and at the same time breaks the rays of the sun, and retards their force, especially if the meshes of the net be not large.

But if Vines were judiciously trained up to the rafters of the hot-house, there would be no need of either of the last-mentioned coverings. The Vines should be planted in the front of the hot-house, and not more than one shoot trained to each rafter, part of which should be cut down to the bottom of the rafters every season, by which means the roof of the hot-house may constantly be kept thinly covered with young wood ; and, by having only one shoot to each rafter, the Vine-leaves will afford a kindly shade, and never incommode the Pines ; for the leaves fall, and the Vines are pruned at a season when the hot-house most requires sun.

The quantity of grapes that may be produced in a Pine-stove is also a desirable object; and the large bunches hanging from the roof become an elegant as well as useful ornament to the stove.

The Method of using Oak-leaves in Hot-houses.

I PRESUME that the leaves of the oak abound with the same quality as the bark of the tree; therefore, the sooner they are raked up, after they fall from the trees, the better, as that quality will naturally decrease during the time they are exposed to the weather.

After being raked into heaps, they should immediately be carried to some place near the hot-house, where they must lie to *couch*. I generally fence them round with charcoal-hurdles, or any thing else to keep them from being blown about the garden in windy weather. In this place we tread them well, and water them in case they happen to have been brought in dry. We make the heap six or seven feet in thickness, covering it over with old mats, or any thing else, to prevent the upper leaves from being blown away. In a few days the heap will come to a strong heat. For the first year or two that I used these leaves, I did not continue them in the heap longer than ten days or a fortnight; but in this I discovered a considerable inconvenience, as they settled so much, when got into the hot-house, as soon to require a supply. Taught by experience, I now

let them remain in the heap for five or six weeks, by which time they are properly prepared for the hot-house. In getting them into the Pine-pits, if they appear dry, we water them again, treading them in layers exceedingly well till the pits are quite full. We then cover the whole with tan to the thickness of two inches, and tread it well till the surface become smooth and even. On this we place the Pine-pots in the manner they are to stand, beginning with the middle row first, and filling up the spaces between the pots with tan. In like manner we proceed to the next row till the whole be finished; and this operation is performed in the same manner as when tan *only* is used.

After this the leaves require no farther trouble the whole season through, as they will retain a constant and regular heat for twelve months without either stirring or turning; and if I may form a judgment from their appearance when taken out, (being always entire and perfect) it is probable they would continue their heat through a second year; but as an annual supply of leaves *here* is easily obtained, such a trial *with us* is hardly worth the trouble of making. However, as a saving in leaves may be an agreeable object in places where they are less plentiful, I was induced to make the following experiments. In 1777, one of the Pine-pits was filled with one part of old and two parts new leaves, well mixed together. And the next year (1778) one pit was filled with old and new leaves in equal quantities. In both these experi-

ments I had the satisfaction to find the pits so filled to retain a heat through each season, equal to the other pits that were filled entirely with new leaves ; and since that time we have always used the whole of the undecayed leaves, mixed along with the new ones.

I also have constantly used the leaves after they were taken out of the hot-house in the early-made hot-beds, and always found them to answer quite as well as fresh leaves.

I must beg leave to observe, that when the leaves are intended to be used a second time, it will be proper at the taking them out of the pits to remove some few at the top, as also on each side, because the leaves at the top and outside of the pit approach most to a state of decay.

After this the Pines will have no occasion to be moved but at the stated times of their management, viz. at the shifting them in their pots, &c. when at each time a little fresh tan should be added, to make up the deficiency arising from the settling of the beds ; but this will be inconsiderable, as the leaves do not settle much after their long *couching*. During the two first years of my practice I did not use any tan, but plunged the Pine-pots in the leaves, and just covered the surface of the beds, when finished, with a little saw-dust, to give it a neatness. This method was attended with one inconvenience ; for by the caking of the leaves they shrunk from the sides of the pots, whereby they became exposed to the air, and

at the same time the heat of the beds was permitted to escape.

Many powerful reasons may be given why oak-leaves are preferable to tanners' bark.ⁱ

First, They always heat regularly; for during the whole time that I have used them, which is near twenty-five years, I never once knew of their heating with violence; and this is so frequently the case with tan, that I affirm, and indeed it is well known to every person conversant in the management of the hot-house, that Pines suffer more from this one circumstance than from all other accidents put together, insects excepted. When this accident happens near the time of their fruiting, the effect is soon seen in the fruit, which always comes ill-shaped and exceedingly small. Sometimes there will be little or no fruit at all; therefore gardeners who make use of tan *only* for their Pines, should be most particularly careful to avoid an *over-heat* at that critical season — the time of *shewing* fruit.

Secondly, The heat of oak-leaves is constant; whereas, tanners' bark generally turns cold in a very short time after its furious heat is gone off. This

ⁱ I believe that oak-leaves are preferable to those of any other sort; but I have found, by repeated trials, that the leaves of beech, Spanish chesnut, and hornbeam, will answer the purpose very well. It seems that all leaves of a hard and firm texture are very proper; but soft leaves that soon decay, such as lime, sycamore, ash, and of fruit trees in general, are very unfit for this mode of practice.

obliges the gardener to give the tan frequent turnings, in order to promote its heating. These frequent turnings, not to mention the expense, are attended with the worst consequences ; for by the continual moving of the pots backwards and forwards, the Pines are exposed to the extremes of heat and cold, whereby their growth is considerably retarded ; whereas, when leaves are used, the Pines will have no occasion to be moved but at the times of potting, &c. — The Pines have one particular advantage in this undisturbed situation ; their roots grow through the bottoms of the pots and mat amongst the leaves in a surprising manner. From the vigour of the plants, when in this situation, it is highly probable that the leaves, even in this state, afford them an uncommon and agreeable nourishment.

Thirdly, There is a saving in point of expense, which is no inconsiderable object in places where tan cannot be had but from a great distance, as is the case here, the article of carriage amounting to ten shillings for each waggon-load. Indeed this was the principal reason that first induced me to make trial of leaves.

My last ground of preference is the consideration that decayed leaves make good manure ; whereas, rotten tan is experimentally found to be of no value. I have often tried it both on sand and clay, also on wet and dry lands, and never could discover, in any of my experiments, that it deserved the name of a manure ; whereas, decayed leaves

are the richest, and, of all others, the most suitable for a garden. But this must only be understood of leaves after they have undergone their fermentation, which reduces them to a true vegetable mould, in which we experimentally know that the food of plants is contained; — but whether that food be *oil*, *mucilage*, or *salt*, or a combination of all three, I leave to philosophers to determine. This black mould, is, of all others, the most proper to mix with compost-earth, and I use it in general for Pines, and almost for all plants that grow in pots: for flowers it is most excellent. The remainder of this vegetable mould may be employed in manuring the quarters of the kitchen-garden, for which purpose it is highly useful.

Leaves mixed with dung make excellent hot-beds; and I find that beds, compounded in this manner, preserve their heat much longer than when made entirely with dung. In both cases the application of leaves will be a considerable saving of dung, a circumstance very agreeable, as it will be the means of preventing the contests frequently observed, in large families, between the superintendent of the garden and the directors of the husbandry.

BOOK II.

ON THE THREE SPECIES OF INSECTS THAT INFEST
THE PINE-APPLE PLANT, WITH AN EFFECTUAL
METHOD OF DESTROYING THEM.

OUR nobility and gentry, with a spirit for gardening not equalled by any other nation, have of late years been at great expense in building large and elegant hot-houses, in order to have the Pine-apple in as great perfection as this climate will admit. Yet, after all, they are frequently disappointed in their hopes of success; not so much from the mismanagement of these plants in point of culture, as from the injury they receive from certain insects, brought with, and generally found upon most of the Pine-plants which come directly from the West Indies.

There are three kinds of insects which breed upon the Pine-apple plant. These are common in many stoves in this kingdom.

1. The BROWN TURTLE INSECT. *Coccus Hesperidum*, Linn. This species is not only found upon the Pines, and most other plants which grow in hot-houses, but also upon many plants which are kept in green-houses. These insects, after they are arrived at a certain age, fix themselves immoveably to the leaves of the plant; but, before atht time, though they generally appear motionless, yet, on a close inspection, in a very warm day,

many of them, and especially the smaller ones, may be perceived to move to different parts of the plant, being in appearance much like a turtle in miniature.

A sweet glutinous matter issues from these insects; this soon turns mouldy, and in time becomes quite black, which causes the plants to appear very unsightly. But as these insects do not in any other respect injure the Pine-plants, I shall pass them over, and proceed to those of a more pernicious nature.

2. The WHITE SCALY INSECT.^a This species is very nearly allied to the former, both of them being *Cocci*, and of the oviparous kind: it seems to be exactly similar to it in its manner of breeding, the process of which the curious naturalists in this branch have observed to be nearly as follows. The eggs, which are discharged from the female, are pushed forward between the skin of the belly and the leaf of the plant to which the insect adheres; in consequence of this, the skin of the belly becomes less distended, which enables the insect to afford a larger covering to the eggs already excluded. When the eggs are *all* discharged, the skin of the belly retreats *close* to the back of the parent insect, which then appears like a mere scale. If the insect in this state be raised, with the point of a needle, from the leaf, a number of eggs may be perceived under it, of a

^a This insect has hitherto remained undescribed. Neither Linnaeus, Geoffroy, Scopoli, or Schæffer, seem to have known it.

pale red colour, and very transparent, not unlike the roe (or eggs) of fishes; but with this difference, that they are not connected by a membrane, but loosely packed together. The mother, with a parental care, not only thus broods over her eggs till they are hatched, but continues to protect her young for a considerable time after, and either dies during the time she is performing this last office for them, or very soon after.

The males of both the above species are much less than the females, and appear very different from them; the latter, except just in their infant state, never assuming any other form than that of a scale, already described; whereas, the males of both kinds, in their last state, become flies; but neither of them can probably do any injury to the Pine-plants whilst they are in that form: for the *flies* of none of the *Coccus* kind have been found, on the strictest examination, by the most able naturalists, to have any organ by which they can take in nourishment. In that state, therefore, they probably continue but a short time, the whole business of their lives being then destined to the impregnation of the females.

I have hitherto only taken notice of the *round* scale, which is the female insect, and which is much the most conspicuous, being far larger than the male. But a careful observer will readily perceive, where *these* scales are numerous, another set of smaller ones intermixed with them, which, if he be unacquainted with the natural history of these

insects, he will hardly suspect to belong to the same animal, as they put on so different an appearance. They are semitubular, and their length scarce exceeds the diameter of one of the small *round* scales, and their breadth is not more than a third or fourth part of their length : these, however, contain the males in one of their last stages, under which they assume the form of *nymphs*, and become flies. In order to be satisfied of this, a person need only break open, with the point of a needle, a few of these scales, when they are arrived at maturity, and he will perceive contained within each of them a very beautiful, but small fly, with all the characters of the flies of the *Coccus* kind.

The length of this fly, from the head to the tail, exclusive of the wings, and those long hairs which are so characteristic of the flies of this kind, is about the thirtieth part of an inch ; and the length, including the wings when folded one over the other on the back of the fly, exclusive of the hairs before mentioned, is about the eighteenth part of an inch. A deep magnifying glass must be used to distinguish the parts of these flies, as they are too small to be seen by the naked eye.

The insects of this last-mentioned species are of a very pernicious nature. When Pine-plants are infested with them, there will be much trouble, and great expense, in cleaning them, even to keep the insects under ; and notwithstanding the greatest care, the plants will suffer much, and in time grow very unsightly ; their leaves will appear yellow and

sickly, and generally a great number of yellow transparent spots may be seen all over them. On the least neglect in destroying them, they will increase innumera- bly, and so beset the lower parts of the leaves next the stem of the plant (where they are most numerous) with scales, as nearly to touch each other. And as they pierce that part of the leaf immediately under the scale with their proboscis, they thereby not only draw out the nutritious juices themselves, but also destroy the tubes through which they flow. The upper parts of the leaves being thus deprived of their nourishment, fall down, and consequently die.

But I have never found that these insects attack the roots of the Pine, as has been frequently asserted.

Some persons also assert that the last described, and the following species of insects, are one and the same; that they breed under the scales, and afterwards descend to the roots of the Pine, and when grown to maturity, are the large white mealy Pine-bug. But the error of this opinion is clearly evinced from hence, that some hot-houses are infested with the one, and not with the other.

3. THE WHITE MEALY CRIMSON-TINGED INSECT.^b This species also has all the characters of a *Coccus*, but in all probability belongs to another subdivision of that genus of insects. For whereas the two former species are undoubtedly oviparous, this

^b This insect, as well as the former, has hitherto remained unnoticed by entomological writers.

seems, on the contrary, to be viviparous. It is most probable that the young ones remain some time in the mealy down of the mother, till they have acquired strength, and are arrived at such a degree of perfection as to enable them to support themselves —when they forsake the parent insect, and disperse themselves to different parts of the plant.

When this species is first perceived on the leaves of the Pine, it appears to be nothing more than small particles of meal, or powder, collected together; but in a few days it assumes the form of a louse or bug, thickly covered with a fine meal or down, of an oval form on its upper, and very flat on its under side, from whence proceed its legs, which are six in number. These, as well as many other particulars in the above description, are not to be distinguished without the help of glasses.

I hope for the indulgence of my candid readers, in case the natural history and description of the three species of insects which I have attempted to give them should be found inaccurate or erroneous. I do not presume to give an historical and regular description of these insects, the principal object of this treatise (the result of many years' application and experience) being to point out to my subscribers a sure and easy method of extirpating them; yet I thought it needful to mention some general characteristics of every species which has hitherto been discovered on the Pine-apple plant, in order to show that every one hitherto known had come within my observation; and had conse-

quently proved the efficacy of the remedy which I take the liberty of offering to the public.

This last-described species is of a more pernicious nature than the former; it attacks every part of the plant, from the top of its fruit even to the most extreme parts of its root. These animals wedge themselves in between the protuberances of the fruit in a most surprising manner, so as not to be got out without great difficulty, which not only makes the fruit appear very unsightly when it becomes ripe, but, by robbing it of its nutritious juices, is the cause also of its wanting flavour and being ill-tasted.

But the bad effects of this species on the *roots* of the plants are yet of a far worse consequence; for there, even at the bottom of the pots, they increase with an uncommon degree of rapidity, so as soon to become very numerous, and in the end to destroy the principal roots of the plants. The common method to extirpate them from this situation, is, by shifting the plants in their pots; at the same time cleansing their leaves and the roots, which is usually styled a *dressing*. Decoctions made from tobacco, wormwood, walnut-leaves, henbane, and other herbs of a bitter or poisonous quality, are generally used on this occasion; and, by some, snuff, sulphur, and pepper are added: but none of these prove to be of a nature sufficiently penetrating. There are insects always between the leaves in the centres of the plants, fixed so low as to escape unhurt; and as they in-

crease, the Pine-plants are soon reduced to the very situation I have just before described, which perplexes and gives the gardener everlasting vexation. Besides, it is evident that this unseasonable business of shifting and dressing the plants will considerably retard their growth, and bring upon them a sickly appearance, especially in their last stage, viz. their fruiting season.

It is observable that the two last species of insects multiply faster on old and sickly plants than on those that are young, and in a more vigorous state. Indeed, the case of vegetables seems very similar to that of animals. From these observations I infer, that these insects cannot be nearly so prejudicial to the Pine-plant in warm climates as with us; for there they are always in a vigorous growing state, and fruit at a more early season.

It will be a matter of much importance to persons that have Pine-plants, infested with one or both of the last species of insects, to know a cheap, easy, and certain method of cure. Indeed, such a knowledge will be very desirable to persons who have hot-houses that are clear of these vermin; for then they may safely admit any Pine-plants from warm climates, which will enable them, without the least danger, to supply their stoves with new and better kinds.

It may not be disagreeable to my readers to be informed of the particulars of my success in the business of destroying these insects, which indeed suggested to me the present method of cure, the

efficacy of which, confirmed by between twenty and thirty years' experience, I can safely venture to recommend.

In the year 1767, when first I came to serve His Grace the Duke of Portland, I found the Pine-plants in the hot-houses at Welbeck entirely over-run with both the last species of insects. Knowing that I could do myself no credit in raising Pines (an object of emulation amongst gardeners) while these vermin remained, I became exceedingly solicitous to extirpate them. The large hot-house being at that time divided into three, by glass-frame partitions, the first step I took towards effecting the above purpose was to remove the infected Pine-plants from one of the smallest of these divisions. This was afterwards stocked with plants from stoves clear of these vermin; which plants were proposed to be increased, and the old stock in the other divisions, from time to time, rooted out. But, notwithstanding every care was taken, as changing the tan, washing the hot-house, &c. I had the mortification to find, in the course of a few months, that this stock was over-run with the last species of insects. This shows that these vermin, at certain seasons, move to every part of a hot-house; it will also serve to show that too great care cannot be taken in cleaning every part of the hot-house, at the time of performing the operation of the method of cure hereafter recommended.

After this disappointment I endeavoured to destroy these vermin by every method I had heard

of, both from public and private information. Amongst the former much was promised. The steam of a hot-bed made of horses' dung, also decoctions made from the several sorts of herbs, &c. before mentioned, have, in their turns, been recommended as effectual: but on trial they proved only impositions on the public. The application of oil and spirits has likewise done the same unkind office. Steeping the Pine-plants in water, heated to a certain degree, regulated by the thermometer, was said to destroy these insects, without injuring the plants. I tried all the above, with many more proposed methods of cure, and although the greatest care was taken in performing each experiment, yet I constantly found myself disappointed. I generally made my experiments on small Pine-plants, for the convenience of keeping them in melon-frames, each parcel apart by itself.

Oil, or spirits of wine, will certainly destroy these insects instantly: this has been observed by many gardeners, and has induced them to affirm that they had found out the long wished for secret. Had either of these methods of cure succeeded, the process would have been very expensive: but the misfortune is, if either of them be applied in large quantities, they instantly destroy the plants as well as the insects; and if the insects are to be found before the remedy be applied, they may as easily be destroyed by any other means. I have already observed, that there are insects fixed so low between the leaves in the centres of the plants,

as not to be found on the most diligent search, and the difficulty has always been to destroy these insects in that situation.

The getting oil to incorporate effectually with water seemed an insurmountable difficulty; and it was no less difficult to preserve a sufficient efficacy in the spirits, as it was necessary to lower them (or let them down as it is termed) with water, lest the plants should be injured. From these considerations it is manifest, that neither of these discoveries will answer the intended purpose.

I observed that the meal, or down, described on the last species of insects (which meal, or down, I presume, like the feathers of water-fowl, greatly abounds with oil) prevented the decoctions from getting to the insects, even after a steeping of twenty-four hours: from thence I was led to imagine that something of a very penetrating nature was requisite to destroy them. After many experiments, and due consideration of the nature of these insects, I luckily happened to think of a remedy which hitherto has proved effectual^c; and I submit it to the public with the most exact precision.

I first tried it on a few Pine-plants, and afterwards upon the whole stock, and in both cases with the greatest success, not one of these de-

^c Since the first publication of this work, I have received, from the most respectable authority, numerous and satisfactory accounts respecting the efficacy of the method here recommended.

structive insects having been since seen in the hot-houses here.

From the time above-mentioned to the present, (twenty-four years,) His Grace has several times had Pine-plants sent from different parts of the West Indies, which were generally infested with one or both of the last species of insects; these plants, after the operation, I have put amongst our sound stock, and always with the greatest safety.

The Receipt.

TAKE one pound of quicksilver. Put it into a glazed vessel, and pour upon it one gallon of boiling water, which let stand till it becomes cold; then pour off the water for use. Repeat this on the same quicksilver (for it will retain its powers) till a sufficient number of gallons are provided to fill a vessel intended for the purpose. One in the form of a trough, that will hold eight or ten gallons, is the most convenient, especially for the large-sized plants.

Then to every gallon of this mercurial water add six ounces of soft green soap, dissolved in a portion of the prepared water. Let the mixture stand till it becomes about milk-warm, which is the degree of warmth it must be kept to during the time of dipping, which operation is performed in the following manner:

[Before the plants are taken out of their pots, I would advise the brushing off a few of the scaly

insects, (as in a common dressing,) especially towards the bottom of the leaves, where they will sometimes be so numerous as in appearance to lie one upon another, in which case the mixture might be prevented from penetrating to the bottom insects. I do not know that this business of brushing is absolutely necessary, but as the whole operation in a large hot-house may be performed in one day, the labour of a person or two extraordinary for this purpose can amount but to a very inconsiderable expense.]

The leaves of the large-sized plants should then be tied together; they will be more manageable in this form than with their leaves loose, and less liable to be damaged. The plants should then be taken out of the pots, and divested of their roots, as also of a few of the decayed leaves at the bottom.

The last species of insects (by gardeners most generally called Pine-bug) will sometimes conceal themselves in holes at the bottom of the stem of the plants, especially in large plants; and as the mixture might be prevented from penetrating into those holes, by the air contained in them, care should be taken to examine that part with great circumspection.

[It may not be amiss in this place to observe, that the earth which comes out of the Pine-pots, together with the leaves and roots taken from off plants, should be removed to a considerable distance from the hot-house. Also that the pots, out

of which the Pine-plants were taken, should not be used again for that purpose, without first being put into boiling water.]

The Pine-plants being now ready, let them be put into the mixture, in which they should remain, with every part covered, for the space of three minutes; then take them out, first letting the tops decline for the mixture to drain out of their centres. The vessel should be immediately filled with fresh plants, and those taken out set in the open air to dry with their roots *downwards*; for by placing them in that position the mixture will descend, and penetrate to the very bottom of the leaves in the centre of the plant, whereby the insects which are concealed there will be totally destroyed. The mixture will change the plants to a sad green colour, which will give them the appearance of being spoiled; but as they become dry, they will in a great measure resume their proper hue.

During the operation it will be necessary to add a supply of hot mixture, in order to keep the whole to a proper degree of warmth, as also to make up the deficiency which must naturally happen.

If the vessel intended for the mixture be made, as above described, to hold ten or a dozen large Pine-plants at one time, two men will dip and set, &c. about one hundred in an hour, and double that number of the lesser-sized ones.

It will be proper to do this work in a fine day, and as soon in the forenoon as convenient, that

the plants may have time to dry, which they will do in a few hours, and then they must undergo the same operation a second time.

In the next dipping, one table-spoonful of sweet oil should be added to every gallon of the mixture. If a table-spoonful of oil, and two ounces of green soft soap be put together, and a little *prepared* boiling water poured thereon, the oil will most readily incorporate.

The process of the second operation being exactly the same as the first, a repetition thereof is unnecessary.

After the second dipping, a sponge should be used to remove any unsightly matter left on the leaves of the plants. They should then be set to dry with their tops *downwards*, that the mixture may drain from every part; for it is necessary that every part of the plant should be quite dry before it is planted.

During the performance of the above operations, a sufficient number of labourers should be employed in getting the hot-house ready for the reception of the plants, [as changing the tan, and cleaning every part of the hot-house, and if the inside of the roof were painted at the same time it would be better. Also, it might be serviceable if a small fire was made in the Pine-pit with charcoal and sulphur, and the house shut up an hour or two to keep in the steam. But in case there are Vines growing in the hot-house, this last operation must

be omitted,] which work must be done with great caution, as I have already observed.

If the above work cannot be done in one and the same day, the Pine-plants may with great safety be set in a dry airy place for a day or two, provided they are not put into heaps, which would greatly damage them in a short time.

The mould intended for the Pine-plants at the first potting should be light and fine; and I would recommend that the pots be small in proportion to the size of the plants, that each plant may be what gardeners term *underpotted*: they will strike root both sooner and better than if put into larger pots, and at their next shifting they will go into proper-sized pots, with their balls and roots entire. At this shifting the mould should neither be so light nor so fine as recommended for the first.

After the Pine-plants are replaced in the hot-house, it will be proper to shade the glasses in the middle of the day, whenever the weather is warm and clear. The house should be constantly kept to a great degree of heat, which will be the means of making the plants strike sooner and stronger; it being evident that they cannot draw themselves weak while in an inactive state: however, as soon as the plants are perceived to grow, it will be necessary to give them by degrees a greater quantity of air.

Great care should be taken to prevent the roots of the plants from being injured by an over-heat of the tan, which may be done by raising the pots, in

case the tan should heat violently. Should oak-leaves be used instead of tan, as is the case at Welbeck, this last caution will be unnecessary.

The plants will require to have no water given them for at least ten days or a fortnight from the time of their being-replaced in the hot-house, and then it should be given very sparingly ; only a little with a pipe, (used in hot-houses,) just to prevent the surface of the mould in the pots from drying too much, as in that case it would crack, and admit the air to the roots of the plants. But the plants should not be watered over their leaves in less time than six weeks from their dressing.

For a twelvemonth after the destruction of the insects, I constantly kept a pound of quicksilver, in a glazed vessel, at the bottom of the cistern which contained the water for the use of the hot-house. Whether the quicksilver impregnated the water in such a manner as to be of any real use, I do not pretend to say : however, this I can with truth affirm, that I never saw Pine-plants grow with greater vigour than those did at that time ; and, as every other kind of plant in the hot-house was watered at that time with the same *impregnated* water, and as all of them were remarkably healthy and vigorous, it is evident that there was nothing prejudicial in the use of it. No expense attends such a trial ; for the quicksilver neither decreases in its quantity or value by either of the foregoing experiments.

The most eligible seasons for the dressing of the

Pine-plants are the months of March and September : the former is most proper for small or succession plants, but cannot be practised on them except in places where there is a variety of hot-houses apart from each other ; and when there is that convenience, March is greatly to be preferred. At that season I strongly recommend that the tan-bed be prepared eight or ten days before, and the pots plunged therein, as the plants will be very greatly benefitted by being put immediately into a good heat. But when the dressing is to be general, the latter month is the most proper : the crop of fruit at that season being commonly nearly over, that part of it which remains may easily be preserved in hot-beds till it is ripe, by contrivances made with melon-frames, which at that season are generally out of use.

I have already observed that the last species of insect, called the *Pine-bug*, moves to every part of a hot-house ; but it is probable that this may be *only* in the very hot part of summer : therefore it may be supposed that at the above seasons they are, in general, upon the Pine-plants.

A farther reason that recommends the above seasons is, that they are the most proper for shifting the Pine-plants in the pots ; and it is at those seasons that the generality of gardeners perform that business.

It may be thought by persons unacquainted with the management of the Pine-apple plant, that the plants receive a material injury by the loss

of their roots at the time of dressing ; but experienced gardeners prefer that method to removing them with balls of earth at their roots, at the time of shifting them in the spring. I have frequently tried both methods, and always found that the plants removed with balls of earth at their roots had a little advantage at first ; but, in the course of the summer, the plants with fresh mould entire always made the greatest progress.

Having thus described my method of destroying these most troublesome insects, and gone through the whole process minutely in all its parts, I shall now beg leave to make a few necessary observations.

First, Was the method of putting quicksilver in the cistern, which contains the water for the use of the hot-house, to be depended upon as effectual, there would be no other way of destroying these insects so cheap and easy ; that business would be done in the common course of watering the plants, and there is a probability of its being successful : for it is evident that the insects, whether at the roots or upon the leaves of the Pine, subsist on the juices of the plants ; and it may be possible for the plants to imbibe a certain quality from the quicksilver sufficient for the above purpose. However, as I verily believe that the insects were totally destroyed *here* before I tried the above method, I cannot say any thing in regard to its efficacy. Yet it would be well if a trial of this sort were made ; in which case I would recommend,

for a short time, the farther trouble of boiling the water, when put upon the quicksilver.

Secondly, The mealy substance on the under-side of the leaves of the Pine is of such a nature as seemingly to resist all watery matter, and has, therefore, prevented all decoctions hitherto used for the above purpose from penetrating to the bottom of the leaves in the centre of the plants, whereby insects in those parts have always escaped.

Thirdly, It is allowed, that if boiling water be poured upon a sufficient quantity of quicksilver, it receives a power capable of destroying lice or insects: but there wanted something to enable it to reach to the insects in question. Soap seemed to be the most proper vehicle for that purpose, on a double account: it is a penetrating substance, and contains a quality of the former nature.

Fourthly, Soap-suds have, perhaps, as great powers of penetration as oil; but oil being added to the second dipping, must make the mixture of equal force. From hence it is probable that the directions given in respect to brushing the insects from off the leaves of the Pine, as also the nice inspection recommended, may be quite unnecessary.

Fifthly, The quantity of soap used renders the mixture of a thick, slimy consistence, and, consequently, leaves a kind of coat, or covering, upon the leaves of the Pine, which very probably may prevent the insects from remaining, or even coming upon the plants, in case any of them were left in the hot-

house. For this reason no water should be given over the leaves of the plants, in less time than six weeks from their dressing, as I have already observed.^d

^d Soap-suds effectually destroy the different species of insects that infest fruit-trees growing against walls. Of these insects the *Aphis* is the most common, as well as the most destructive. It generally attacks, with great violence, the peach, cherry, and plumb. The Aphides are universally known by the appellation of *Lice*.

The *Acarus*, though not so fatal to plants growing in the open air as when under glass, is also very prejudicial to the above trees, when planted against walls.

The *Thrips* are sometimes very numerous on peach and nectarine trees; but they are less hurtful than either of the former species. Besides the above, there are two or three sorts of the *Cocci* that are very common upon fruit-trees; but, as they adhere very closely to the branches, they are not so conspicuous, and consequently less known. However, trees that are much infested with the *Cocci* are in the summer very distinguishable, as wasps constantly attend these insects, to feed on the sweet matter that issues from them. When the *muscle-shaped Coccus* has been very numerous, I have known hive-bees frequent the trees in great abundance.

In the spring, the *Aphis*, the *Acarus*, and *Thrips*, are few in number, in comparison to what they are in the summer. However, I have constantly observed the two former species on the buds of the trees before they break into leaf, especially on such trees as have been much infested with them the preceding summer.

It is most probable that the insects that survive the winter, in whatever state, are concealed during that period, either under the branches of the trees, or in the shreds that fasten them to the wall; else in the nail-holes or crevices of the wall. In all these situations the soap-suds have fully answered my most

Lastly, The Pine-plants, after their dressing, fill the hot-house with a strong-scented effluvium,

sanguine expectations. The operation is far from being either troublesome or expensive; and the method is practicable at any season, but more especially between the fall of the leaf and the time the blossom-buds are nearly ready to open. Proceed thus:

Take any quantity of soap-suds, after a common washing; but when they are thick and strong they should be lowered with water. A person on a ladder should pour them from a watering-pot, over both trees and wall, beginning at the top of the wall, and bringing it on in courses from top to bottom. The suds, when used, should be many degrees warmer than new milk, especially in the winter; and when plentifully and properly applied, every part of the wall will appear of a pale red colour, not in the least disagreeable.

Most large families, in the course of a few months, make a quantity of the above liquid sufficient to wash a great extent of wall. The soap-suds made here this last winter have been sufficient to wash all the principal walls in Welbeck garden. Besides the advantage of destroying insects, the suds appear to be productive of other good effects. When applied just after the fall of the leaf, they contribute much to preserve the wood of the delicate and tender kinds of peaches. I account for it thus:—It is allowed that our summers are in general too short to perfect the wood of the tender kinds of peach and nectarine trees, without artificial means; and when the wood of these trees is imperfectly ripened, it is very subject to the canker, especially if in the succeeding winter there happen a succession of *rain* and *frost*. This the nursery-man, as well as gardener, often woefully experiences.

I constantly have observed that the *canker* originates at, or close adjoining to, the *buds* of the last year's wood. The cause seems to be this. Wood imperfectly ripened is always soft and spongy, and therefore admits of imbibing a large portion of

which continues a considerable time. It perhaps may be so nauseous to the insects in question, as to destroy them; or, at least, to cause them to abandon the place, and escape through crevices into the open air, where, in all probability, they soon perish.

From the two last observations, there does not

moisture in rainy weather. The bud, and the fine capillary vessels adjoining it, being surcharged with moisture in a wet evening, when the frost comes at night it freezes the moisture in the vessels, and causes it to expand, which, by tearing the vessels asunder, brings on a decay of the parts. Now the soap-suds seem to leave a glossy kind of coat or covering on the branches, and the oily particles contained in the suds, by penetrating them, prevent their being overcharged with moisture.

But here it may seem strange that oil should act this friendly part, when it is well known to be so highly pernicious to plants in general. That it is so, in its genuine state, is proved by daily experience. The general and received opinion of *wool* being poisonous to plants, is from no other cause than from the oil contained in it.

But notwithstanding that oil has this pernicious effect on plants, when in its original and genuine state, still, when made miscible, perhaps nothing is more nourishing and friendly to them. This brings me to consider soap-suds as a *manure* to the borders; for it is evident that, by the rains and dews, the principal of it does terminate there at last; and this important consideration alone is sufficient to recommend the practice.

It may seem unnecessary to observe, that soap-suds contain a larger portion of oily particles, after a common washing, than in the original state.

I shall conclude this digressional note with observing, that soap-suds keep trees clear of moss, and render the bark clear and healthy.

seem to be an absolute necessity for the particular care recommended in cleaning every part of the hot-house; nor even for a more material article, viz. the changing of the tan, which would be the principal part of the expense. Every other expense for a large hot-house will come within the compass of a few shillings.

Although the result of the above observations seems to be founded on the greatest appearance of *probability*, yet I do not affirm the least circumstance that is not grounded on *experience*. This account of my practice is given with the most scrupulous exactness; and, from a careful perusal of it, I dare venture to assert, that I have not omitted the minutest article. I therefore trust and believe, that whoever shall pursue the same mode of practice, will, in the end, find his labours crowned with the same success which I have hitherto had the good fortune uniformly to experience.

BOOK III.

ON THE DIFFERENT SPECIES OF INSECTS THAT ARE FOUND IN HOT-HOUSES, WITH EFFECTUAL METHODS OF DESTROYING THEM.

BESIDES the different species of insects which are so pernicious to the Pine-apple plant, and which are described in the foregoing part of this work, there are other kinds of insects in most stoves, which frequently prove very troublesome; and though they are not injurious to the Pine-apple, are yet very prejudicial to most other plants kept there, either for use or ornament. It may therefore not be improper to bring them also under consideration.

1. The APHIS.^a This, I believe, is the most numerous of all the kinds of insects in this island :

^a The APHIS is of the *Order* HEMIPTERA.

Its Characters are :

The rostrum of the Aphis is bent inwards.

Their antennæ are setaceous, and longer than the thorax.

They have either four erect wings, or are without wings. Some authors assert that the male Aphides have wings, and that all the females are without.

Their feet are made for walking.

They have generally two little horns or hairs placed on the hinder part of their abdomen.

The Aphis has six feet, and the tarsi in each sex have only one articulation.

for in the spring months they seem in a manner to swarm upon most sorts of trees, shrubs, and plants; and even in most soils the very grass of the field abounds with them; for which reason they are generally termed the lice of the plants which they respectively infest.

The rose and peach-trees are very subject to be over-run with these insects; and if no means are used to extirpate them, they will, in a short time, take such entire possession of the plants, that every part of the young wood will appear to be covered with them: they not only cause a stagnation of the juices, but also rob the plants of their nutriment, thereby reducing them to a weak state.

The leaves of the peach-tree, in particular, are often observed to be curled up, and covered with a sweet clammy substance, which is solely owing to the quantity of these insects which settle upon them. Besides, many kinds of flowers and exotic plants which are kept in stoves are very subject to be infested with them.

The Aphides are easily destroyed three ways:
1. By fumigating the house, in which the plants are kept, with tobacco. 2. By dressing the in-

The insects belonging to this singular genus, in the summer bring forth live young, and in the autumn lay eggs. Entomologists assert, that from the copulation of the parents spring daughters, grand-daughters, great-grand-daughters, and great-great-grand-daughters, or females fecundated to the fifth (some assert to the ninth) generation.

fectured plants with snuff or tobacco-dust. 3. By a decoction or infusion of tobacco. The manner and application of all these will be hereafter considered.

2. The ACARUS^b, commonly called the *Red Spider*. This is a pest to almost every kind of plant, for this insect is not only exceedingly pernicious to most plants kept under glass, but is also very prejudicial to many growing in the open air, particularly to some kinds of fruit-trees when trained against walls: as for instance, the cherry, plumb, apricot, and peach. When the Vine grows under glass, it is very liable to be greatly infested with this pernicious species, but I never knew the Acari attack it in the open air.

In hot dry weather the increase of these insects is exceedingly rapid, and when they become numerous, they, by various means, soon make great

^b The ACARUS is of the *Order* APTERA.

Its Characters are :

Two eyes placed on the sides of the head remote from one another.

Its mouth or proboscis is formed by a small-pointed rostrum inclosed in a sheath.

The antennæ are shorter than the proboscis, and said to be articulated, and made like feet.

The head of the same size, and united to the thorax.

The Acarus has eight feet, made for running.

There are many species of this genus: some live upon other animals, quadrupeds, birds, and insects; some of the last-mentioned class are often quite covered with them; others of them live in the water; others upon trees, plants, &c. They are oviparous.

havock on the plants : for this insect, with its proboscis, perpetually wounds the fine or capillary vessels of plants, and extracts their nutritious juices. It also works a web about the leaves, and over the tender buds and tops of the plants, in such a manner, as nearly to suffocate them, and prevent their vegetation.

3. The THRIPS.^c This is also a very pernicious species of insect, and is very common in hot-houses, as well as upon plants in the open air. It is not so generally known as the two former genera, partly by reason of its minuteness (for the Thrips is in general so small as to be scarcely perceptible), and partly from the manner of its concealing itself

^c The THRIPS is of the *Order* HEMIPTERA.

Its Characters are :

The rostrum of the thrips is small and obscure.

The antennæ are as long as the thorax.

The body is slender, and of equal thickness in its whole length.

The abdomen is reflexible, being frequently bent upwards.

The four wings are extended, incumbent upon the back of the insect, narrow in proportion to their length, and cross one another at some distance from their base.

The Thrips has six feet, and the tarsus of each foot has only two articulations.

These insects are very common on many kinds of plants and flowers, and are generally very numerous on peaches and nectarines, especially on that side of the fruit next the wall : in this situation they are of a larger size than those usually found on plants or flowers ; and with great ease may be discerned by the naked eye, when the fruit is just gathered from the tree.

along the veins of the leaves of plants, from which it skips with great agility on being touched.

The Thrips is a great enemy to the Vine while he leaves are young and tender, especially to the delicate sorts, whether they grow in the open air or under glass; but in the latter case they are generally attacked with the greater severity.

It is no uncommon thing to see in a hot-house whole crops of French beans entirely destroyed by them, especially late in the spring, when the weather becomes warm. The Cape Jasmine, as well as many other exotic plants, often fall a prey to these minute insects.

The Thrips may be destroyed by the same methods as the Aphides.

The ONISCUS^d, or *Wood-Louse*. As the Onisci are exceedingly numerous in most hot-houses, I shall on that account just mention them here, although I have never known them to injure plants except when first they rise from seed: this, how-

^d The ONISCUS is of the Order APTERA.

Its Characters are:

The antennæ are setaceous, and bent.

The mouth is furnished with two palpi.

The head is intimately joined to the thorax.

The body is of an oval form, and composed of several crustaceous plates.

The Oniscus has fourteen feet.

The Onisci change their skin like many other apterous insects.

They are very common in houses, gardens, and woods, and are generally called *Wood-lice*.

ever, may be easily prevented by dusting snuff or tobacco-dust upon them when in that tender state. The Onisci breed in the tan, on which they seem in a great measure to subsist.

5. The *Coccus HESPERIDUM*^e, commonly called the *Brown Turtle Insect*. This has been already described on account of its being generally found upon the Pine-apple plant: however, as it inhabits many plants, both in the hot-house and green-house, I judge it proper to take notice of it again.

These insects may be destroyed, at a certain age, by fumigation: therefore, in hot-houses where

^e The *Coccus* is of the *Order* HEMIPTERA.

Its Characters are:

The rostrum of the *Coccus* is situate in the breast.

The hinder part of the abdomen is bristly.

The *Coccus* has six feet.

The males have two wings, which, when at rest, are incumbent.

The females are without wings.

The female *Cocci* fix themselves and adhere, almost immovably, to the roots, branches, and leaves of plants, where they are visited by the winged males, which are of a size considerably smaller. Some of them having thus fixed themselves, lose entirely the form and appearance of insects; their bodies swell, their skin stretches, and becomes smooth, the segments of their abdomen disappear, and they so much resemble some kinds of galls or excrescences found frequently on the leaves and branches of plants, that in general they are mistaken for such.

In some species the males are but few in number, in proportion to the females, and their duration is exceedingly short.

that operation is frequent, these insects are rarely to be met with.

6. The FORMICA^f, or *Ant*. These are often exceedingly numerous in hot-houses, and especially where the Aphides and Coccus Hesperidum abound; for there is a sweet glutinous matter which issues from these insects (being either the excrement of the insect, or produced by it from some other cause) that seems to be the principal incitement that draws the ant thither.

The Ant may be destroyed with great facility, by setting pots containing honey and water, in the same manner as is practised for catching wasps and flies.

^f FORMICA, or ANT, is of the Order HYMENOPTERA.

Its Characters are :

The antennæ form an angle, their first articulation being very long in proportion to the others.

The mouth is armed with jaws.

The abdomen is joined to the thorax by a short stalk.

The females and neuters are armed with a sting, which is concealed within the abdomen.

The males and females are winged, the neuters have no wings.

The ant has six feet.

The ant lives in societies composed of males, females, and neuters; the males are much smaller than the females and neuters, but are distinguishable from the largeness of their eyes; which are not so well proportioned to the size of their bodies as in the other sexes.

No sooner is the work of generation performed, than the male and female ants perish, as well as most of the neuters; some of these, however, outlive the winter, but pass that season in their habitation, without movement, or any signs of life.

7. The *GRYLLUS* ^g, or *Cricket*. Crickets usually abound in bake-houses and warm habitable buildings; but as they are furnished with wings, and during the hot months in summer make excursions in the open air, they are constantly found in dry banks and hedges; consequently every hot-house is liable to be infested with them.

When once a hot-house gets infested with Crickets, the great fire-heat usually kept serves to encourage their increase, and they soon thereby become very numerous.

^g The head of the *GRYLLUS* is inflected, armed with jaws, and furnished with palpi.

The antennæ, in some subjects, are setaceous, in others, filiform.

The wings are declined towards, and wrapped round the body; the under ones are folded up, so as to be concealed under the elytra.

All the feet are armed with two nails or two crotchets; the hind ones are formed for leaping.

The *Grylli* are divided into different sections as follows:

1. The *ACRIDÆ*.
2. The *BULLÆ*.
3. The *ACHETÆ*. The house-cricket belongs to this family.
4. The *TETIGONIÆ*.
5. The *LOCUSTÆ*.

The larvæ, or caterpillars, of the *Grylli*, very much resemble the perfect insects, and, in general, live under ground.

The chrysalids very much resemble and accompany their parents, many of which feed upon the leaves of plants. Others, which live in houses, prefer bread, meal, and every kind of farinaceous substance; some of them are with us called *locusts*, others *grasshoppers*, others again, *crickets*.

I have known, in some hot-houses, great depredations having been committed by this species: for when they become numerous they do not content themselves in preying upon the foliage of plants only, but even attack the fruit also.

Crickets, too, are very prejudicial in hot-houses on another account; for they work the lime out from between the courses of the brick-work in the flues, &c. to their great detriment.

Crickets may easily be destroyed by a mixture of oatmeal, sugar, and arsenic. — A small quantity of the latter will suffice for a large proportion of the two former ingredients.

The mixture should be laid in small quantities in different parts of the stove. And it will be necessary to repeat the applications at intervals for two or three weeks, until the whole are exterminated.

To prevent accidents, great care should be had in the application.

Having now described the different species of insects that infest hot-houses in general, I shall next proceed to give directions for extirpating them; after which I shall lay down some rules for keeping the hot-house tolerably clear of them. I say *tolerably* clear, for it will be proper here to observe, that the case of these indigenous insects is very different from that of such as are exotic and peculiar to the Pine-apple plant: for a hot-house being once cleared of *them*, will remain so for ever, provided no fresh plants are taken in from abroad

or elsewhere ; but the seven sorts of insects last mentioned, are likely to continue to perplex and give the gardener everlasting vexation ; particularly the *Acarus* and *Thrips*, which are the most pernicious. They are natives, abound in every garden, and in warm dry weather are possessed of such agility, that supposing a hot-house perfectly clear of them to-day, it may probably not be so to-morrow ; and when once these intruders have entered into possession, their increase is so rapid, that they soon become exceedingly numerous.

On Fumigating the Hot-house.

THE method of performing this operation, either by the bellows or smoking-pot, is so generally understood, that a description may here seem unnecessary. I shall, nevertheless, give a few hints on the subject, which I trust will be of service.

First, The most eligible seasons for fumigating the hot-house are the spring and autumn ; when, if need require, it should be repeated every eight or ten days. In the summer it sometimes happens that this operation is attended with inconvenience from the heat of the weather, but more especially when Vines grow in the hot-house ; for at the time their fruit is near ripe, it would be liable to give it a smoky flavour.

Fumigation is best performed late in an evening, and proves most efficacious when the weather is moist and calm ; for the smoke is retained much

longer in the house when the air is still, and the cavities in the roof, particularly those between the squares of glass, filled with moisture.

The Aphides may be destroyed with a gentle fumigation; but the Thrips and *Coccus Hesperidum* require a smoke so strong, that a person cannot distinguish an object further than at the distance of four or five feet.

When a hot-house is greatly infested, either with the Aphides or Thrips, the fumigations should be repeated every third or fourth night for three or four times, and then one may proceed according to the former directions: the reason and necessity of these repetitions proceeds from a probability that the smoke cannot affect the insect in the egg, and perhaps it may not have much power over them in some other of their states; therefore a fresh brood may naturally be expected in the course of a few days.

Some are of opinion that it is of great use to fumigate hot-houses constantly every eight or ten days, (whether it is required or not in respect of insects,) alleging, that the smoke will contribute to the vigour of the plants: but from this I must beg leave to dissent, as nature seems to stand in need of no such superfluous assistance. I must acknowledge, however, that I have found no inconvenience from this practice, when used with the moderation here described. The expense attending it is very inconsiderable, as tobacco grown in this country will answer the purpose very well.

The *Acarus* does not seem to be affected by fumigations made with any ingredient that I could hitherto discover, and I am inclined to think that the apterous insects, or those without wings, are not so much affected by fumigations as the winged tribe. Indeed this species of insect has hitherto been esteemed unconquerable, for which reason I flatter myself that what I have to offer on this head will not be the most unacceptable, or least useful part of this treatise; for, from repeated trials, I can venture to assure my readers, that the mixture recommended for destroying the insect on the Pine-apple plant, will have the same effect on this species also. It not only destroys the insects actually existing on the plants at the time of the operation, but also totally prevents their eggs from coming to maturity, and consequently secures us from the danger of a succeeding brood, without the least injury to the plants. However, notwithstanding this fair and promising prospect, I cannot but very sincerely lament that the benefits of this method do not extend so far as to be very serviceable either to melons in frames, or fruit-trees growing against walls in the open air: but as it will be found exceedingly useful to plants kept in hot-houses in general, I shall give such directions respecting its application as I have found best to answer the purpose.

Plants greatly infested, and growing in pots, when their tops are not very large, may, with great facility, be dipped in a convenient vessel filled with

the mixture recommended for the Pine insects, and which should be kept warm during the operation. The top of the plant need only remain a few seconds in the mixture, and it should then be set in a close shady place, (a green-house is very proper in an evening after the sun is gone off the windows,) to prevent its drying too rapidly.

Two or three days after the operation, the top of the plant should be refreshed with clean water ; and from that time a gentle sprinkling may be given it constantly, which will greatly accelerate its growth.

The Acari most generally reside on the *under-side* of the leaves of plants, and when they are very numerous, they work so thick a *web* thereon, that it sometimes prevents the mixture from entering into certain hollow parts of the leaves of some kinds of plants, by which means a few insects escape unhurt ; in which case it will be proper for the plants to undergo the same operation the succeeding evening, which will most assuredly destroy all that have escaped the former operation.

I have taken the liberty to mention this particular, lest some persons might condemn the method here recommended as ineffectual, without taking the trouble of attending to the cause of its failure.

Large, or climbing plants, when their leaves are large, as for instance, the *Vine*, must be dressed with the mixture by means of a *sponge* : this has the appearance of a tedious operation ; but in a

dark day, when the hot-house is not very warm, a person will make a great progress therein in the course of a few hours.

The following mixture I have found to be equally efficacious with the former; and although it is not so proper to be applied to exotic plants, on account of its disagreeable smell, it seems very likely to be of great use to fruit-trees against walls, as well as to melons in frames, which also are often much injured by the *Acarus*.

Take two ounces of soft green soap;

One ounce of common turpentine;

One ounce of flowers of sulphur.

Put these ingredients into a proper vessel, and pour upon them one gallon of boiling water. Let the whole be well worked together with a whisk, which will bring it to a strong lather, and cause the ingredients to incorporate.

The mixture must be used milk-warm, and kept gently stirring, during the time of using, to prevent the sulphur from subsiding.

As the *Acari* generally reside on the *under-side* of the leaves of plants, from the position of wall-trees, it is impossible for any external application to destroy the insects that are so situated: however, it is very probable that the strong smell of the turpentine and sulphur may be so disagreeable as to cause them to change their residence, and to seek for refuge on other plants.

I must beg leave to observe, that I think this mixture may be of considerable use in preventing

the mildew on the peach and apricot : for sulphur alone retards the progress of that most fatal disorder, and the soap and turpentine render the mixture of a slimy consistence, and leave a clammy coat or covering on the leaves, of a glossy appearance, which very likely may contribute to stop the progress of that disorder. But the fruit-trees here having been constantly clear of the mildew, I have therefore not had an opportunity of making any other experiment with it than upon exotic plants, on which it had the desired effect ; and the plants did not seem to have sustained the least injury.

I shall observe, that this method ought by no means to be practised on fruit-trees near the time that their fruit is ripening, as the mixture would probably discolour the fruit, and render it disagreeable to the taste.

But melons in frames may be sprinkled with it at all times when they require it, because that fruit may easily be covered with a cabbage-leaf, or any thing of the kind, at the time of the operation.

A strong lye, made of wood-ashes, will likewise destroy the Acari ; but that, as well as *briny* and *spirituous* compositions, ought never to be applied to plants, because they greatly injure them, and commonly cause their leaves to fall off.

Having given directions for extirpating the more pernicious kinds of the insects above described, when numerous, I shall now suggest a few hints

that may be found useful in preventing their becoming so.

First, The *Acarus* may be destroyed with good effect on the Vine, or any other plant that has large leaves of a firm texture, by the following method :

Take a small brush, such as is used for common painting, the bristles of which should be long, soft, pliable, and quite dry at the time of using ; then one hand being laid flat on the upper surface of the leaf, draw the brush gently with the other, two or three times, backwards and forwards, on the under-side.

The body of the *Acarus* being very soft, and its construction exceedingly delicate, it is therefore destroyed with the most gentle touch. Besides, the brush most readily wipes off their web, as well as their globular transparent eggs, which are, by a fine membrane, fastened to the leaves of plants ; on which sometimes they are so exceedingly numerous, as even to astonish the beholder when looked at through a proper glass.

The operation is most readily performed, and very greatly retards the progress of this most pernicious insect. The brush being so soft in its nature, does not, if any tolerable degree of care and attention be given, in the least incommode or injure the plants.

Secondly, The dusting of plants frequently with flowers of sulphur is very disgusting to the *Acari*, and prevents their increase. In hot-houses or

melon-frames, where sulphur is frequently and plentifully used ^h, that insect never makes any great progress ; but the smell of the sulphur renders the hot-house exceedingly disagreeable.

The best method of applying sulphur is, to puff it on the plants by the help of a small engine, such as is used by hair-dressers, and the plants should be in a moist state at the time of the operation. The same engine will, with great facility, throw snuff, or tobacco-dust, upon plants infested with the Aphides or Thrips. ⁱ

Thirdly, The keeping of a hot-house in a moist state, by watering the walks and flues late in an evening, and the frequent sprinkling of plants with water, contributes to retard the progress of insects, particularly the Acari, which are very impatient of

^h The most effectual way of using sulphur for the destruction of the Acari in general, is, by spreading it all over the top of the flues, and particularly that part of the flue near the fire-place, where it is generally kept very hot.

Some think washing the walls and flues with a mixture of sulphur and water with a little unslacked lime and size (just to set the wash) has also been attended with good effect. But much depends on the nature of the sulphur used. The best sulphur for this purpose is that made by a slow process. Native sulphur is also sometimes used for the above intention.

ⁱ The efficacy of flowers of brimstone, in destroying the scaly insect on Pines, has been confirmed by the experience of many ; when lightly puffed upon the plants, with a hair-dresser's puffing machine, the sulphur will, in once or twice using, hardly leave one in ten thousand of these insects alive, and with very little repetition now and then, will perfectly clear the house of them, without the least damage to the plants.

moisture. Water will instantly reduce them to a state of inaction; and this has induced some to believe that it will destroy them: but I have often put the tops of plants, infested with them, under water for ten or twelve hours, and always found them recover their usual vivacity and vigour as soon as they became dry.

Fourthly, During the hot summer months, the dipping the tops of plants frequently in clean water will clear them of many insects; and if performed late in an evening, is wonderfully refreshing, and greatly accelerates their growth. But if a little tobacco be added to the water, so as to make a mild infusion, and also a small quantity of flowers of sulphur, just at the time of using, it will be more efficacious in respect to insects, and not less refreshing to the plants.

In this operation there is no necessity for the top of the plant to remain under water longer than a few seconds.

Lastly, Besides the advantages which plants receive from being at all times kept clear of insects, they have other benefits arising from cleanliness. I therefore strongly recommend the keeping every part of a hot-house clear of dirt, as it will greatly contribute to the health and vigour of the plants. To obtain this desirable end, let the inside of the roof be kept duly painted: let the pots at all times be kept clean of weeds and moss, and their tops constantly refreshed with fresh mould: see that the faded flowers and leaves be taken off before

they decay, which otherwise would tend to render the air in the house impure : observe also to keep the walks and flues particularly clean from every sort of dirt. For we should always bear in mind, that the vegetable, as well as the animal creation, delights in cleanliness.

INDEX

TO THE

TREATISE ON THE PINE-APPLE.

	A.	Page
ACARUS infests every kind of plant	- - -	336
—— its characters	- - -	<i>ib. n.</i>
—— how to destroy	- - - 346, 347. 349, 350	
Air , a due proportion of, required for the hot-house	-	282
—— should be admitted in the night as well as day, in very hot weather	- - - -	283
—— how admitted into the hot-house	- - -	<i>ib.</i>
—— the method of admitting it by the back wall, or through the green-house, condemned	-	284
Antigua Brown Pine , a description of	- - -	247
—— esteemed the best sort	- -	248
—— sometimes do not fruit at a proper age, with a remedy for this accident	- -	268
Antigua Queen Pine , a description of	- - -	248
Aphis , the most common as well as most destructive of all the kinds of insects that infest fruit-trees	330. <i>n.</i>	
—— are the most numerous of all the insect tribe in this island	- - - -	334
—— its characters	- - - -	<i>ib. n.</i>
—— singular effects arising from their copulation	-	335. <i>n.</i>
—— how to destroy	- - - -	335, 336
Artificial dew , how to raise	- - - -	277
—— of great utility in the hot-house	-	<i>ib.</i>
August , a proper season for shifting fruiting plants in their pots	- - - -	268

	Page
B.	
Barbadoes, a Pine so called - - - - -	254
Brown Turtle Insect, a description of - - - - -	310
Briny compositions pernicious to plants - - - - -	348, 349
Black Jamaica Pine, a description of - - - - -	251
C	
Canker on fruit-trees, how produced - - - - -	331. <i>n.</i>
——— how to prevent - - - - -	332. <i>n.</i>
Cleanliness contributes to the health and vigour of plants - - - - -	351
Coal, the most general fuel used in hot-houses - - - - -	289
Covering the roof of a hot-house not absolutely neces- sary - - - - -	298
——— different modes of - - - - -	300
Covers should be removed in the day-time - - - - -	301
Coccus, its characters - - - - -	339. <i>n.</i>
——— two or three sorts of, that infest fruit-trees - - - - -	330. <i>n.</i>
——— the muscle-shaped produce a sweet matter that invites wasps and hive-bees - - - - -	<i>ib. n.</i>
——— Hesperidum, how to destroy - - - - -	339
Compost mould for the Pine-apple plant, how to prepare - - - - -	279
——— for crowns, suckers, and young plants - - - - -	280
——— for fruiting plants - - - - -	281
——— when prepared, how to order - - - - -	282
Cricket, see Gryllus - - - - -	341
Crowns of the Pine-apple, how to manage - - - - -	258
D	
Dew, artificial, how to raise - - - - -	277
——— of great use in the hot-house - - - - -	<i>ib.</i>
Deer's dung recommended for Pine compost - - - - -	280
——— should be collected when newly fallen - - - - -	<i>ib.</i>
Decoctions of herbs not sufficiently penetrating for the purpose of destroying the Pine insects - - - - -	329
Dipping the tops of plants in water in summer evenings, recommended - - - - -	351

	Page
Dominica, a Pine so called - - - - -	254

E

Evening, a proper time for watering the Pines in summer	286
---	-----

F

Fire, absolutely necessary for the hot-house - -	289
—— should be very moderate in winter - - -	<i>ib.</i>
—— should be increased in spring - - -	290
—— sometimes necessary in summer - - -	291
—— what space it should be allowed to work - -	<i>ib.</i>
Fire-place, how to construct - - - - -	294
Flues, how to preserve - - - - -	291
Formica, often numerous in hot-houses - - -	340
—— its characters - - - - -	<i>ib. n.</i>
—— how to destroy - - - - -	340
Fruit of the Pine, when ripe, how to distinguish -	272
Fuel, often burnt without effect - - - - -	292
Fumigations, when best performed - - - - -	343
—— observations on - - - - -	344

G

Garden, incomplete without a hot-house - - -	245
Glass, often broke by covering - - - - -	298
—— often broke by the weather, and the cause -	<i>ib.</i>
—— the squares of, their proper dimensions - -	299
—— how to put in the frames - - - - -	<i>ib.</i>
—— should not lap too far over each other - -	300
Gold-striped Pine, its beauty and elegance described	253
—— produces an excellent fruit - - -	253
Grapes, an important object in Pine stoves - -	304
—— bunches of, are ornamental as well as useful -	<i>ib.</i>
Gryllus, or Cricket, its characters - - - - -	341
—— are very hurtful in Pine stoves - - - - -	342
—— when numerous, feed upon the fruit, as well as the foliage of plants - - - - -	<i>ib.</i>
—— how to destroy - - - - -	<i>ib.</i>

	Page
H	
Havannah Pine, a description of - - - -	251
Hot-house, a good one, may be considered as a garden of itself - - - -	245
----- Pines its principal object - - - -	<i>ib.</i>
----- if properly constructed, may answer equally well for Vines - - - -	<i>ib.</i>
----- should be kept in a cool state in November and December - - - -	265
----- constructions of a new kind particularly adapted for a FRUITING-HOUSE - - - -	274
----- how to collect the water that falls on its roof - - - -	288
----- construction of, at Welbeck (<i>See plate VI.</i>)	
----- should be screened from the violence of the sun in summer, and how - - - -	302, 303
----- should be kept in a moist state in summer - -	351
----- how to keep in proper order - - - -	<i>ib.</i> 352
Hot-beds, best made with leaves mixed with dung -	309
----- are sometimes made for young Pine plants -	262
----- how to prepare - - - -	<i>ib.</i>
----- the temperature of, to be correctly attended to - - - -	<i>ib.</i>

I

Insects, description of the three species that infest the Pine-apple plant - - - -	310
----- increase faster on old and sickly, than on young and vigorous plants - - - -	317
----- different kinds of, that infest fruit-trees - -	330. <i>n.</i>
----- how to destroy in winter - - - -	331. <i>n.</i>

J

January, the time when fruiting Pine-plants form themselves for fruiting - - - -	270
Juice of the Pine decreases with length of day - -	302

K

King Pine described	- - - - -	252
—— its fruit of inferior quality	- - -	<i>ib.</i>
Kiln for burning Lime in stove fire-places, particularly described	- - - - -	292. <i>n.</i>
—— first of the kind in this kingdom, at Billing, in Northamptonshire	- - - - -	293. <i>n.</i>

L

Leaves of trees, method of using them in the hot-house	- - - - -	304
—— of the oak are preferable to those of any other sort	- - - - -	307. <i>n.</i>
—— are preferable to tanners' bark	- - -	307
—— the various sorts of which are proper, and improper, for this mode of practice, duly considered	- - - - -	<i>ib. n.</i>
Leaves of the oak, mixed with dung, make excellent hot-beds	- - - - -	309
—— how to convert into vegetable mould	- - -	281
Light essentially promotes the growth of plants	- -	302
Lime, method of making it in stove fire-places	- -	292. <i>n.</i>
—— profits attending this mode of practice particularly explained	- - - - -	293. <i>n.</i>
—— this new mode of practice brought from Ireland by the Right Hon. Lord John Cavendish	- -	<i>ib. n.</i>

M

March, a proper time for shifting succession plants in the pots	- - - - -	267
—— the most proper time for destroying the insects on the Pine	- - - - -	327
Meal, or down, on the Pine-Bug, supposed to abound with oil	- - - - -	320
Melons in frames, method of destroying the Acari on them	- - - - -	348
Mildew on Peach and Apricot trees, how to prevent	-	<i>ib.</i>

	Page
Montserrat Pine, a description of - - - -	250
Morning, a proper time for watering Pine-plants in the spring and autumn, - - - -	287
Moss, on fruit-trees, how to prevent - - - -	332. n.
Mucilage of Gum Arabic makes quicksilver miscible with water - - - - -	241

N

Nets, sometimes used to shade stove-glasses - -	303
---	-----

O

Oak-leaves, method of using them in hot-houses - -	304
————— continue their virtue thro' a second year -	305
————— are useful in hot-beds when thrown out of the hot-house - - - - -	306
————— are preferable to tanners' bark - -	307
Oil, in its natural state, is pernicious to plants - -	319
— when made miscible with water, is nourishing and friendly to plants - - - - -	332. n.
Oniscus, its characters - - - - -	338
————— is exceedingly numerous in hot-houses - -	ib.

P

Pens in sheep pastures, useful for making compost for Pines - - - - -	279
Pine-apple plant, its varieties - - - - -	246
————— differently propagated, and how -	255
————— the form of its seed - - - -	ib.
————— how to raise from seed - - - -	256
————— how raised by crowns - - - -	258
————— how raised by suckers - - - -	260
————— method of shifting it in March - -	267
————— method of shifting it in August -	268
————— should have no water after the fruit is full swelled - - - - -	271
————— some former methods of culture dis- approved - - - - -	272

	Page
Pine-apple plant, succeed best in stoves newly erected	275
----- the reasons why accounted for	<i>ib.</i>
----- how to manage when it shows fruit in autumn	276
----- when large, should be placed in the tan-bed at the time of removal, into the position it before stood in	277
----- does not suffer, like other plants, by being kept too dry	285
----- should be shaded in violently hot weather	302
Pine-apple, when ripe, how to know	272
----- -- how to produce large	273
----- -- how to bring into regular succession, when too many plants show fruit together	276
Pipe to draw water from the centre of plants, a description of	287
Plants grow faster in the night than the day	301
Pots, when burnt hard, are improper for the Pine plant	286
----- a scale of the different dimensions required for the Pine-apple plant in all its stages	263
Providence Pine, a description of	248
----- fruit of one cut at Welbeck in 1794, that weighed 5½lb. or 84 oz.	249

Q

Queen Pine, a description of	247
----- its fruit often cut when in a green state	254
Quicksilver should be kept in the cistern that contains the water for the use of the hot-house	326
----- neither decreases in its weight or value, by impregnating either hot or cold water	<i>ib.</i>
----- a probability of its communicating its virtues to cold water sufficient to destroy insects	323
----- boiling water poured upon, receives a power capable of destroying lice or insects	329
----- how to make miscible with water	241

	Page
R	
Rain-water seems to contain the food of plants - -	287
Receipt for destroying the Pine insects - - -	321
Red Spider, see Acarus - - - -	336
Red-fleshed Pine, the probability of there being no such fruit - - - - -	254
----- a plant brought from Holland in 1771, said to be of that kind - - - -	<i>ib.</i>
Ripley Pine, a description of - - - - -	252
S	
Seedling Pines, many kinds of, raised at Welbeck -	246
September, a proper season for shifting large crowns and suckers - - - - -	264
Silver-striped Pine, its beauty and elegance described	252
Smoke, on what principles it works in stove-flues -	292
----- dissertation on - - - - -	293, 294
Snuff, how to throw upon plants - - - - -	350
Soap-suds supposed to have as great powers of penetra- tion as oil - - - - -	329
----- are efficacious in destroying insects on fruit- trees - - - - -	330. <i>n.</i>
----- how to be applied - - - - -	331. <i>n.</i>
----- are a good manure - - - - -	332. <i>n.</i>
----- prevent moss on trees - - - - -	<i>ib.</i>
Soil, light, causes young Pine-plants to run into fruit	281
Spirituous compositions are pernicious to plants - -	348
St. Vincent Pine described - - - - -	249
----- is by some called the Green Olive Pine - - - - -	250
Steaming of the Pine stove, a new mode of practice -	294
----- is said to be particularly advantageous in the destruction of insects - - - - -	295. <i>n.</i>
----- plants in steam may be said to be subjected to a kind of heated bath - - - - -	<i>ib.</i>
----- advantages attending this mode of practice considered - - - - -	296

	Page
Steaming, plan of a steaming-house, with an explanation	297. <i>n.</i>
Striped Queen Pine described	253
————— an accidental variety of the common	
Queen Pine	<i>ib.</i>
Suckers are produced on various parts of the plant	255
———— are preferable to crowns	256
———— when and how to be taken off the plants	261
———— their treatment, and method of planting	263
Sugar-loaf Pine, much esteemed	250
———— three sorts of	<i>ib.</i>
———— description of	<i>ib.</i>
———— sometimes does not fruit at a proper	
age	268
———— how to manage in that case	<i>ib.</i>
Sulphur destroys the Acari	350
———— how to be applied to plants	<i>ib.</i>
———— if properly and constantly applied, will destroy	
the white scaly insect on Pines	<i>ib. n.</i>
Sun and light give maturity to the nightly progress of	
plants	301

T

Tan-bed, how to increase its heat without moving the	
Pine plants	270
———— should be watered in summer	278
———— its violent heat generally proves fatal to plants	<i>ib.</i>
Thermometer, what degree of heat to be kept to in	
winter	265. <i>n.</i>
———— made for sale by the Author	<i>ib.</i>
———— sometimes used to determine the heat of	
the tan-bed	268
Thrips, sometimes very numerous on fruit-trees	332. <i>n.</i>
———— pernicious to hot-house-plants	337
———— its characters	<i>ib. n.</i>
Tobacco, grown in this country, useful in gardens	345
Tobacco-dust, how to throw upon plants	350
Tobago, a Pine so called	254

	Page
Turf, from a pasture, used for Pine compost	279
—— how treated after being pared off	<i>ib.</i>

U

Urine of sheep greatly enriches compost	280
—— contains a greater quantity of mucilage, or oleaginous matter, than dung	281
—— observation on its effect in sheep pastures	<i>ib.</i>

V

Variegated Pine, its beauty and elegance described	252
Vegetables delight in cleanliness	352
Vegetable mould, how to make	281
—— its use in compost, &c.	309
Vines, the best method of training them in hot-houses	303

W

Water, less should be given to the Pine-plant in a moist than in a dry season	264
—— how drawn out of the centres of fruiting-plants	287
—— observations on its quality	<i>ib.</i>
—— from wells sometimes used in hot-houses	<i>ib.</i>
—— from ponds or rivers preferable	<i>ib.</i>
—— that falls from the heavens best of all	<i>ib.</i>
—— collected from the dews in dry weather	288
—— the possibility of its being used many times over	<i>ib.</i>
—— from the roof of a hot-house, how to be collected	<i>ib.</i>
Watch-sticks most generally used to determine the heat of the tan-bed	268
Watering the top of the tan-bed in summer, its great use	278
—— the Pine-apple plant, general observations on	284
—— over the Pine leaves, how to be performed	286
—— in the summer should be late in the evening	<i>ib.</i>
—— in moist weather should not be frequent	287

	Page
West India islands, observations on the state of the weather there - - - - -	285
White scaly insect, a description of - - - - -	311
----- hitherto unknown to Entomologists	<i>ib. n.</i>
----- very prejudicial to the Pine-apple plant - - - - -	313
----- does not infest the root of the Pine	314
----- the males have wings - - - - -	312
White mealy crimson-tinged insect, a description of -	314
----- supposed to be vivi- parous - - - - -	315
----- hitherto unknown to Entomologists - - - - -	<i>ib. n.</i>
----- most pernicious to the Pine-plant - - - - -	316
Wool, supposed to be poisonous to plants, and why -	332
Wood-louse, see Oniscus - - - - -	338

Y

Young Pine plants, how to prevent their fruiting in the spring - - - - -	266
----- do not grow fast in violently hot weather - - - - -	285

THE END.

OF AMERICA

FROM 1776 TO 1876

BY

JOHN P. KENNEDY

OF THE UNIVERSITY OF CHICAGO

NEW YORK: HARVARD UNIVERSITY PRESS

1876

THE HISTORY OF THE UNITED STATES

OF AMERICA

FROM 1776 TO 1876

BY

JOHN P. KENNEDY

OF THE UNIVERSITY OF CHICAGO

NEW YORK: HARVARD UNIVERSITY PRESS

1876

THE HISTORY OF THE UNITED STATES

OF AMERICA

FROM 1776 TO 1876

BY

JOHN P. KENNEDY

OF THE UNIVERSITY OF CHICAGO

NEW YORK: HARVARD UNIVERSITY PRESS

1876

EXPLANATION OF THE PLATES.

TREATISE ON THE VINE.

√ PLATE I. p. 103.

- a a* Pits for fruiting Pine-plants.
- b b* Pits for succession, or young Pine-plants.
- c c* Front wall.
- d* Fire place partly in the front wall, which is worked only in very cold weather.
- e e e* Flue.
- f* Cistern which receives the water that falls on the roof of the hot-house.
- g g g g g g g* Walks in the stove.
- h h* Small porches which close with double doors at the entrance of the stove.
- i i* Fire-places in the middle of the back wall, which communicate with the flues *k k*.
- l l* Fire-places at the ends of the back wall, which communicate with the flues *m m*. — N. B. The flues *m m* make one return, as represented in the section.
- n n n* Close-fire houses.
- o o* Open sheds.
- p* Pipe that conveys the water to the cistern.
- q* Level of the border in front of the stove.
- r* Foundation of the front wall.
- s* Apertures, or holes through which vines are conveyed.
- t* Stone in front with a groove to receive the water that falls from the roof.
- u v w* Top, middle, and lower lights.

√ PLATE II. p. 108.

- a* Fire-house.
- b b* Fire-places which communicate with the flues *c c*.

EXPLANATION OF PLATES.

c c First flues.

e e Third flues.

d d Second flues.

f f Fourth flues.

* * * One fire ought not to be allowed to work more than about thirty feet in length, because by the time it has made four returns, (viz. 120 feet) its heat is generally nearly spent. As the heat decreases proportionable to the distance from the fire-place, the diminishing of the dimensions of the flues is obvious. On this account, some persons who give designs for building of hot-walls, recommend a brick on edge instead of a brick in breadth for the front of the two uppermost flues. When this expedient is intended, it will be proper to have narrow bricks of the thickness of common bricks, made on purpose to suit the work. — But if the wall is intended to be drawn with stucco, this last precaution will not be necessary.

PLATE III. Six different stages of Vines trained against a wall, p. 117.

IV. Extensive Vine at Northallerton, Yorkshire, p. 186.

V. Section of a hill for the growth of Vines in England, p. 204.

These five plates to be placed after p. 232.

TREATISE ON THE PINE-APPLE.

PLATE

I. Section of a Fruiting-house, p. 275.

II. A Lime-kiln, p. 292.

III. A Steaming-stove, p. 296.

IV. Three Species of Pine Insects, p. 310.

V. A plan of a Pine-Stove, &c. see plate at p. 232.

VI. A plan of an improved Pine and Grape-stove.

These six plates to be placed at the end of the Volume.

Section of a Frying House.

Plate I. p. 275.

W. Speckly, del.

J. W. Speckly, Sc.

Published Sept. 1st 1803, by Longman & Co. as the Act directs.

1849

Handwritten text, possibly a signature or date, appearing upside down.

Description of plate 2

Page 252

W. Speechley del.

J. Wiegley Sc.

A Steaming Stove.

Plate III. p. 296.

W. Speckby del.

50 Feet.

J. Mayes Sc.

Three Species of Pine Insects.

Fig. 1.

Fig. 2.

Fig. 3.

PE & T

levation

20

J. Wigley: Sc.

PLAN of a GRAPE & PINE STOVE.

Section ?

Elevation of the Front Wall.

a Pine pit.
b Flues.
cccc Walks.
dd Doors.
ee Fire places.
ff Flues.
gh Upper & lower lights.
iii Holes through which vines are conveyed

W. Speechley del.

J. M. Speer sc.

LIBRARY OF CONGRESS

0000909457A